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Project Number: 2004-81

FINAL ENVIRONMENTAL ASSESSMENT

SOUTH JACKSON-SOUTH MEMPHIS 161-KV TRANSMISSION LINE TAP TO GALLAWAY SUBSTATION

FAYETTE COUNTY, TENNESSEE

TENNESSEE VALLEY AUTHORITY

NOVEMBER 2004

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ACRONYMS

APE	Area of Potential Effect
ARAP	Aquatic Resource Alteration Permit
BMP	Best Management Practice
CFR	Code of Federal Regulations
EA	Environmental Assessment
EMF	Electric and Magnetic Fields
EO	Executive Order
GIS	Geographic Information System
HRHD	Harpeth River Historic District
I	United States Interstate
kV	Kilovolt
MW	Megawatt
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
OSHA	Occupational Safety and Health Administration
SHPO	State Historic Preservation Officer
SMZ	Streamside Management Zone
SR	State Route
SWTEMC	Southwest Tennessee Electric Membership Corporation
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

CHAPTER 1

1. PURPOSE OF AND NEED FOR ACTION

1.1. Proposed Action: Improve Power Supply

Tennessee Valley Authority's (TVA) proposed action is to serve Southwest Tennessee Electric Membership Corporation's (SWTEMC) planned substation at Gallaway by building an approximately 5.8 mile, 161-kilovolt (kV) transmission line connection from the existing South Jackson-South Memphis 161-kV Transmission Line to the new substation by May 2005 (Figure 1-1).

1.2. Need

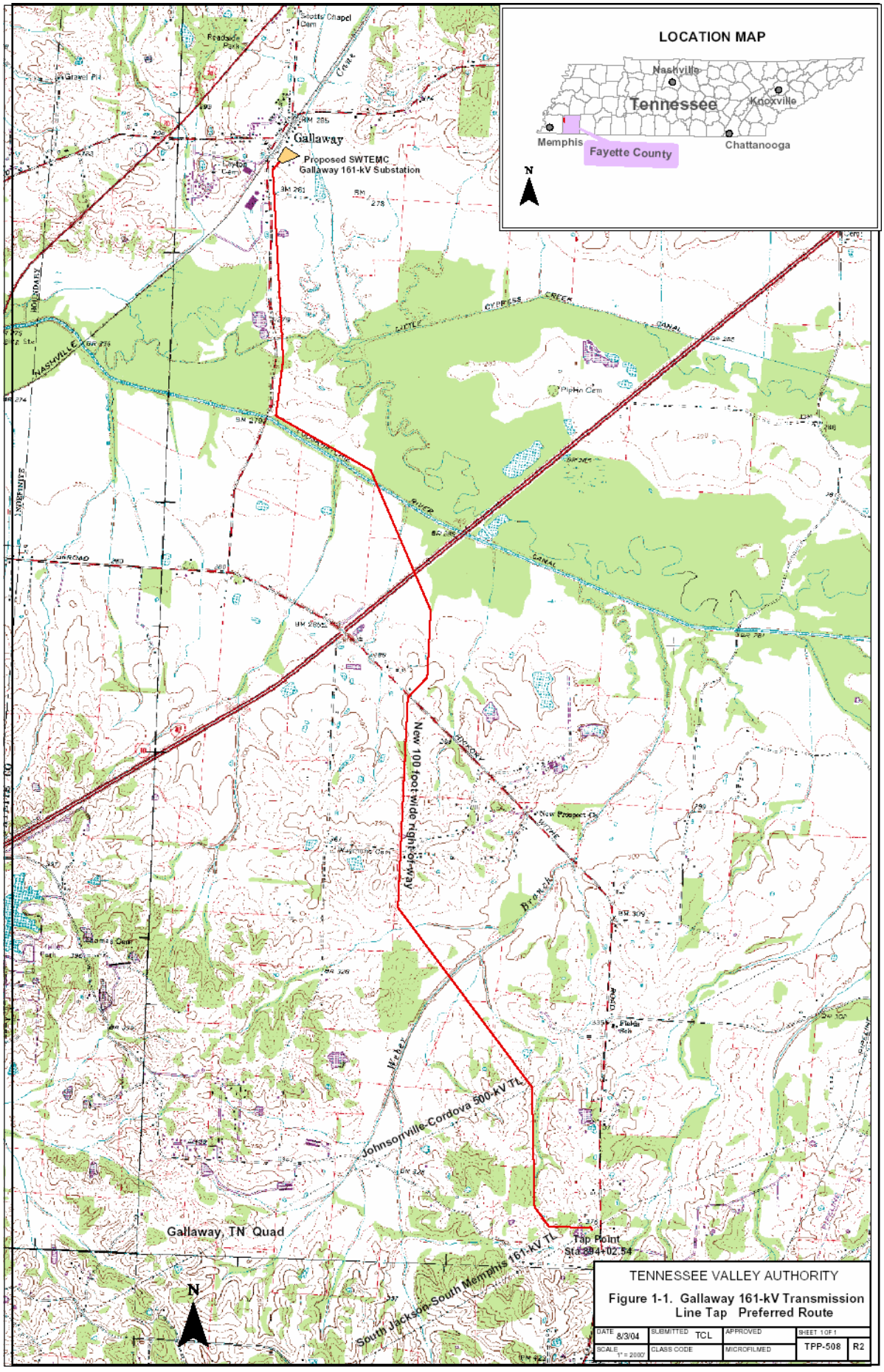
SWTEMC provides electricity to the Gallaway area from its Mason 69-kV Substation, which is supplied from TVA's Covington 161-69-kV Substation. The west Fayette County portion of its service area is experiencing steady, heavy growth in electric demand. A large part of the electric system growth is due to an expansion of its largest customer Medegen Medical Products, a plastics company. The anticipated initial load increase with the expansion is expected to be 3 megawatts (MW) with another 2.5 MW planned in the future. Medegen Medical Products expects to add 162 new jobs to the area. A 1500-acre residential development in the project area is also underway, which is expected to add an additional 2 MW to the system.

SWTEMC is at its capacity limits feeding into the Gallaway area from Mason. This increasing load is creating system loading and voltage problems on the distributor's system serving this area. The current planned development is expected to cause overloading on the distributor's existing 69-kV system by the summer of 2005.

Reliability, as well as capacity, is a concern in providing adequate service to the area. Since reliability decreases as loading increases, the peak load conditions predicted would result in a system even more likely to experience outage. To address these issues, SWTEMC is planning to build a new 161-kV substation on the south side of the CSX Railroad and just east of State Route (SR) 196.

1.3. Objectives of the Fayette County, Tennessee, Power Supply Improvement Project

To serve SWTEMC's planned substation and to help address the power demand needs in the Gallaway area, TVA proposes to construct a new 161-kV transmission line from TVA's existing South Jackson-South Memphis 161-kV Transmission Line located in the nearby Hickory Withe Community to SWTEMC's new Gallaway Substation. TVA would also install 13-kV revenue metering at the substation. One of the objectives of this new transmission line would be to supply additional electric load capacity to the SWTEMC system where planned commercial and residential growth has increased the load demand.


LOCATION MAP
Nashville
Tennessee
Knoxville
Memphis
Fayette County
Chattanooga
N
Gallaway
Proposed SWTEMC
Gallaway 161-kV Substation
New 100 foot wide right-of-way
Johnsonville-Cordova 500-kV TL
South Jackson-South Memphis 161-kV TL
Tap Point
Sta 884+02.54
Gallaway, TN Quad
N
TENNESSEE VALLEY AUTHORITY
Figure 1-1. Gallaway 161-kV Transmission Line Tap Preferred Route
DATE 8/3/04
SUBMITTED TCL
APPROVED
SHEET 1 OF 1
SCALE 1" = 2000'
CLASS CODE
MICROFILMED
TPP-508
R2

Another objective of TVA's proposed new 161-kV transmission line would be to increase the system's reliability. Current growth projections anticipate an overloading of the SWTEMC system by ongoing and already planned development in this area. As early as 2005, power demand increases will reduce the SWTEMC system's reliability, resulting in increases in system outages, especially at times of high electricity use.

1.4. Decisions That Must Be Made

TVA must decide whether to build a new 161-kV transmission line to serve SWTEMC's planned substation that is need to improve the electrical service in the SWTEMC service area. This is described in detail in Section 2.2.

Making this decision involves

- Timing of the improvement.
- The best route for a transmission line.
- What mitigation and/or monitoring measures to implement to meet TVA standards and minimize resource damage.

1.5. Public Involvement

The following Federal, state, and local agencies and other organizations have been contacted to date by TVA concerning this project.

- United States Army Corp of Engineers
- Tennessee Conservation League
- Tennessee Department of Agriculture
- Tennessee Department of Economic and Community Development
- Tennessee Department of Environment and Conservation
- Tennessee Department of Transportation
- Tennessee Historical Commission
- Tennessee Wildlife Resources Agency

This proposal was reviewed for consistency with Executive Order(EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), Farmland Protection Policy Act, National Historic Preservation Act (NHPA), Endangered Species Act, Section 404 of the Clean Water Act, and EO 12372 (Intergovernmental Review). Correspondence received related to this coordination is contained in Appendix I.

TVA held a public meeting in the project area on March 11, 2004. Seven potential transmission line route options were presented to the public for comment. These are described in Section 2.5.3 of this document as Routes A through G (Figure 1-2).

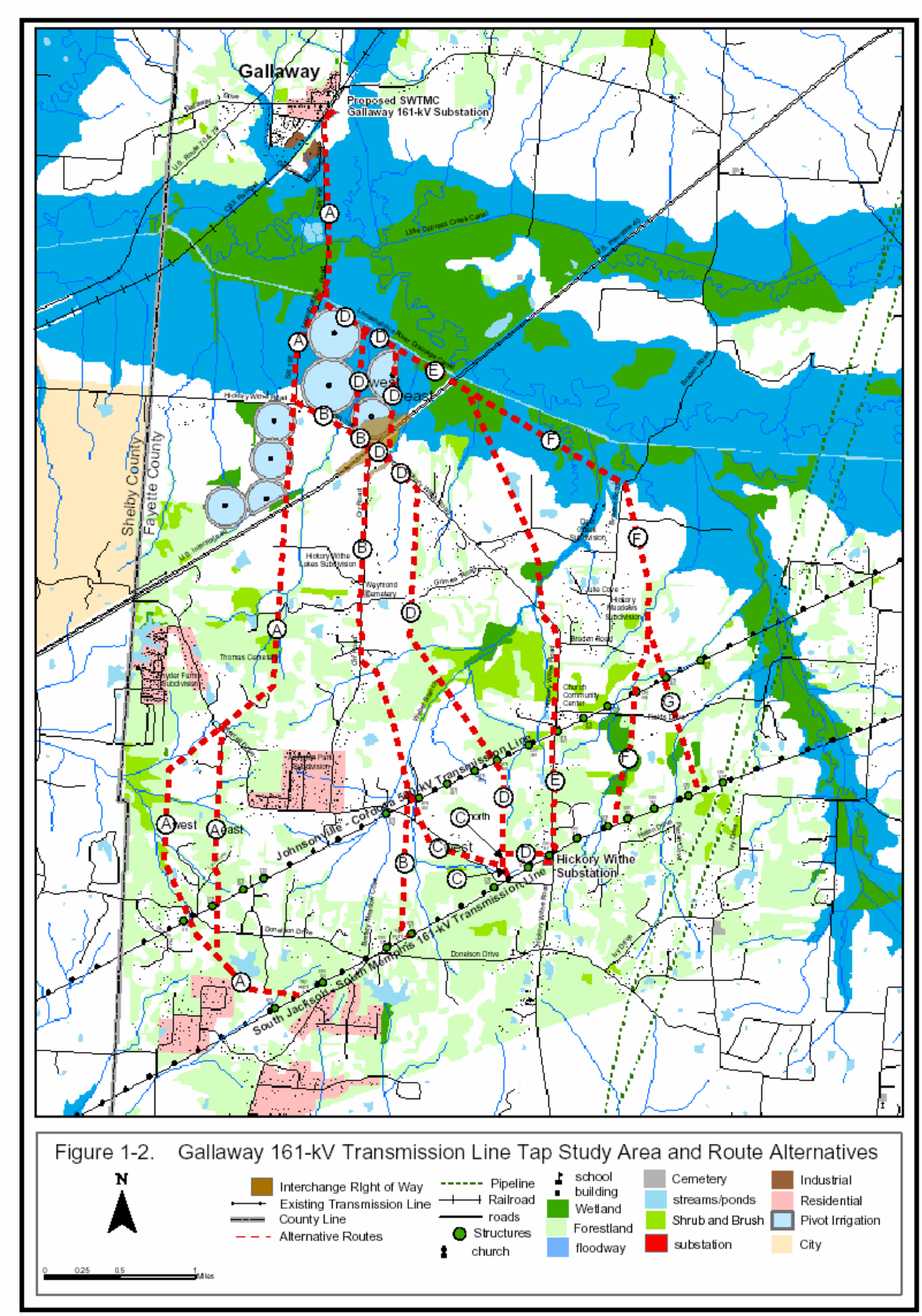


Figure 1-2. Gallaway 161-kV Transmission Line Tap Study Area and Route Alternatives

Ten public officials and 313 potentially affected property owners within these corridor routes were specifically invited to the meeting, and through newspaper advertisements, TVA invited any other interested members of the public. TVA issued a news release to local news outlets. Total attendance at the meeting was 112.

During a 30-day public comment period following the open house, TVA accepted public comments on potential line routes and other issues. A toll-free phone number and fax number were made available to facilitate comments. Comments were primarily related to the location of the transmission line relative to current or planned land issues. Several owners made routing suggestions that were utilized immediately, such as relocating to the north a section of transmission line along the Loosahatchie River that seven of the route options shared. The move would avoid a landowner's pivot irrigation system. Many commenters provided information and land use updates that enhanced TVA's understanding of route issues and usage constraints. Of the potential route options presented at the meeting, Route D was the preference of the majority of those expressing an opinion. This preference was due to the increased impact potential of the other route options on existing homes and future development.

1.6. Necessary Permits or Licenses

A permit would be required from the state of Tennessee for construction site storm water discharge for the transmission line construction. TVA's Transmission Construction organization would prepare the required erosion and sedimentation control plans and coordinate them with the appropriate state and local authorities. A permit would also be required for burning trees and other combustible materials removed during transmission line construction. Bank stabilization activities along the Loosahatchie River may require an Aquatic Resource Alteration (ARAP) permit from the State of Tennessee and a 404 permit from the United States Environmental Protection Agency (USEPA).

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CHAPTER 2

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Introduction

Chapter 2: Alternatives Including the Proposed Action is the *heart* of this Environmental Assessment (EA). This chapter has the following five major sections:

- Description of Alternatives
- Alternative Eliminated From Detailed Study
- Description of Construction, Operation, and Maintenance of the Proposed 161-kV Transmission Line
- Project and Siting Alternatives
- Identification of the Preferred Alternative

2.2. Description of Alternatives

2.2.1. Alternative 1 – Do Not Build Additional Transmission Line (No Action)

Under this alternative, TVA would not construct a new transmission line. As a result, the SWTEMC could decide to build the transmission line itself. Absent this, the increasing load due to ongoing and already planned development could not be met by SWTEMC, and system outages, especially at times of high electricity use, would occur or some other action would have to be taken.

2.2.2. Alternative 2 – Construct Transmission Line

Under this alternative, TVA would construct a new 161-kV transmission line from the SWTEMC's new Gallaway Substation to TVA's existing South Jackson-South Memphis 161-kV Transmission Line. This alternative would meet the growing power needs in the Gallaway area. It would require the purchase and clearing of new transmission line right-of-way for a distance ranging from approximately 5.7 to 6.5 miles, depending on the final route option. All of the new transmission line right-of-way would be located on private land.

2.3. Alternative Eliminated from Detailed Study - Increase Capacity at Covington 161-kV and Mason 69-kV Substations

Under this alternative, SWTEMC would forego building its planned substation for the time being. Rather, SWTEMC would increase the transformer capacity at TVA's Covington 161-kV Substation by installing a third 161-kV transformer and replacing the two existing 69-kV transformers at its Mason 69-kV Substation with larger units to handle the additional load. The distributor would also reconductor 11 miles of existing 69-kV transmission line serving the Mason and Covington Substations with a higher capacity conductor. Finally, SWTEMC would build a new 12-mile distribution line from its Mason Substation to Medegen Medical Products in Gallaway to serve the expanding load at the plant. While this alternative is technically feasible, SWTEMC decided to build its planned substation instead.

Moreover, the long length of the transmission and distribution lines would continue to make them very susceptible to outages due to additional line exposure. Additionally, with no voltage increase in the distribution system, the anticipated load growth within the service area is expected within a few years to redevelop overload conditions even with the implementation of this alternative. More new transmission line right-of-way, as well as changes to transmission lines on existing right-of-way, would be required for this alternative and, therefore, it has increased potential for environmental impacts. While this alternative would not require the expenditure of money by TVA, it would result in costs to SWTEMC of about $4.9 million greater than Alternative 2. As a result of these identified issues, it was determined that this alternative would not address the reliability or capacity concerns in the SWTEMC service area and, therefore, was eliminated as a viable alternative.

2.4. Description of Construction, Operation, and Maintenance of the Proposed 161-kV Transmission Line

2.4.1. Transmission Line Construction

2.4.1.1. Structures and Conductors

The proposed transmission line would primarily use single-steel poles (Figure 2-1) with structure height varying according to the terrain and averaging between 80 to 90 feet. At creek or highway crossings, taller double poles (H-frame) may be used in order to meet clearance requirements.

a  b 

Figure 2-1. Single-Pole (a) and H-Frame (b) 161-kV Transmission Structures

Three conductors (the cables that carry the electrical current) are required to make up a circuit in alternating current transmission lines. For 161-kV transmission lines, each conductor is made up of a single cable. The conductors are attached to fiberglass or ceramic insulators suspended from the structure cross arms. A smaller overhead ground wire is attached to the top of the structures. This ground wire may contain fiber optic communication cables.

Poles at angles in the transmission line may require supporting guys. Some structures for larger angles could require two or three poles. Most poles would be directly imbedded in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional 2 feet. The holes would normally be backfilled with the excavated material. In some cases, gravel or a cement and gravel mixture might be used. Some structures may be self-supporting (non-guyed) poles fastened to a concrete foundation, which is formed and poured into an excavated hole. The two tap point switches would be installed at the tap point, located at Chickasaw Electric Cooperative's (EC) Hickory Withe 161-kV Substation in a 40-foot-by-40-foot laced-steel structure, fastened on four concrete foundations. This structure would be about 40 feet above ground level.

Equipment used during the construction phase would include trucks, truck-mounted augers and drills, as well as tracked cranes and bulldozers. Low ground-pressure-type equipment would be used in specified locations to reduce the potential for environmental impacts.

2.4.1.2. Right-of-Way Acquisition and Clearing

New right-of-way 100 feet wide would be needed for the transmission line. TVA would purchase easements from landowners for the new right-of-way on private land. These easements and land give TVA the right to construct, operate, and maintain the transmission line, as well as remove danger trees from the right-of-way. Danger trees include any trees that are located off the cleared right-of-way and are tall enough to pass within 6 feet of a conductor or structure should it fall toward the transmission line. Fee title for the land within the right-of-way would normally remain with the landowner, and a number of activities could be continued on the property by the landowner. The easement would prohibit certain activities such as the construction of buildings and any other activities within the right-of-way that could interfere with the transmission line or create a hazardous situation.

Because of the need to maintain adequate clearance between tall vegetation and transmission line conductors, as well as to provide access for construction equipment, most trees and shrubs would be initially removed from the entire width of the right-of-way. Equipment used during this right-of-way clearing would include chain saws, skidders, bulldozers, and/or low ground-pressure feller-bunchers. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site. In some instances, vegetation may be windrowed along the edge of the right-of-way to serve as sediment barriers. Vegetation removal in streamside management zones (SMZs) and wetlands would be restricted to trees tall enough, or with the potential soon to grow tall enough, to interfere with conductors. Clearing in SMZs would be accomplished using hand-held equipment or remote handling equipment, such as a feller-buncher, in order to limit ground disturbance. TVA Right-of-Way Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction, and Transmission Construction Guidelines Near Streams are in Appendixes II, III, and IV.

Subsequent to clearing and construction, the right-of-way would be restored as much as is possible to its state prior to construction. Pasture areas would be reseeded with suitable grasses. Wooded areas would be restored using native grass and other low-growing species. Erosion controls would remain in place until the plant communities were fully established. Streamside areas would be revegetated as described in Appendixes II-IV.

2.4.1.3. Access Roads

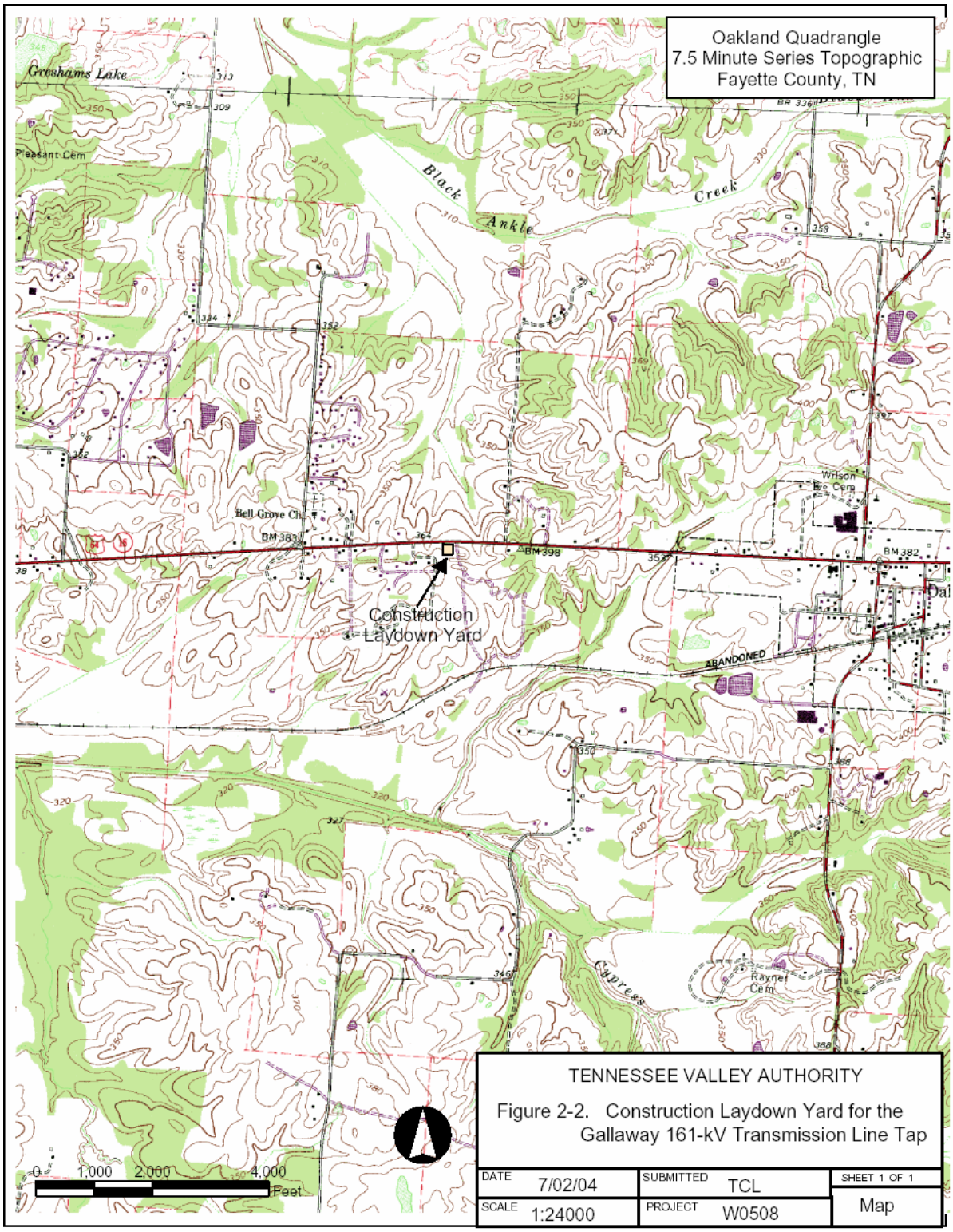
Permanent access roads would be needed to allow vehicle access to each structure and other points along the right-of-way. Thirteen access roads were identified along the proposed transmission line and were included in the environmental field review. TVA would obtain the necessary rights for these access roads from landowners. Existing roads including farm and field roads, some of which may need upgrading, would be used where possible. New access roads would be located on the right-of-way wherever possible and designed to avoid severe slope conditions and minimize stream crossings. New access roads would be about 20 feet wide and surfaced with dirt or gravel. Culverts and other drainage devices, fences, and gates would be installed as necessary. Culverts installed in any permanent streams would be removed following construction; however, in wet-weather conveyances, they would be left or removed, dependent upon the wishes of the landowner or any permit conditions that might apply. New temporary access roads would be restored to previous conditions. If graveled, the gravel on the temporary access roads would be removed and the area planted with approved seed mixtures following construction. Additional applicable right-of-way clearing and environmental quality protection specifications are listed in Appendixes II and III.

2.4.1.4. Construction Assembly Areas

A construction assembly area would be required for worker assembly, vehicle parking, and material storage. The site identified for this is located on Pierce Road off U.S. Highway 64 in Oakland, between a concrete plant and storage facility. This site is approximately 3 acres in size and would be leased for the duration of the construction period, approximately 7 months. The site consists of a relatively flat and previously cleared location adjacent to an existing paved road near the transmission line (Figure 2-2). Some minor grading and installation of drainage structures may be required. The area would be graveled and fenced so that trailers used during the construction process for material storage and office space could be parked at this location. Following the completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. Removal of the fence and restoration would be at the discretion of the landowner. No environmental impacts were identified with using this site as the construction assembly area and no other site in the vicinity appears to have better features for such a use.

2.4.1.5. Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to various staging areas along the right-of-way, and temporary clearance poles would be installed at road and railroad crossings to reduce interference with traffic. A small rope would be pulled from structure to structure. It would be connected to the conductor and ground wire and used to pull them down the line through pulleys suspended from the insulators. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys.


Oakland Quadrangle
7.5 Minute Series Topographic
Fayette County, TN
Greshams Lake
Pleasant Cem
Black Ankle Creek
Bell Grove Ch
BM 383
BM 398
BM 382
Wilson Bro Cem
Construction Laydown Yard
ABANDONED
Rayner Cem
Cypress
0 1,000 2,000 4,000
Feet
TENNESSEE VALLEY AUTHORITY
Figure 2-2. Construction Laydown Yard for the Gallaway 161-kV Transmission Line Tap
DATE 7/02/04
SUBMITTED TCL
SHEET 1 OF 1
SCALE 1:24000
PROJECT W0508
Map

2.4.2. Operation and Maintenance

2.4.2.1. Inspection

Periodic inspections of 161-kV transmission lines are performed from the ground and by aerial surveillance using a helicopter. These inspections, which occur on approximately 5-year cycles after operation begins, are conducted to locate damaged conductors, insulators, or structures, and to report any abnormal conditions that might hamper the normal operation of the line or adversely impact the surrounding area. During these inspections, the condition of vegetation within the right-of-way, as well as immediately adjoining the right-of-way, is noted. These observations are then used to plan corrective maintenance or routine vegetation management.

2.4.2.2. Vegetation Management

Management of vegetation along the right-of-way would be necessary to ensure access to structures and to maintain an adequate distance between transmission line conductors and vegetation. For a 161-kV transmission line, National Electric Safety Code standards require a minimum clearance of 24 feet.

Management of vegetation along the right-of-way would consist of two different activities: felling of danger trees adjacent to the cleared right-of-way and control of vegetation within the cleared right-of-way.

Management of vegetation within the cleared right-of-way would use an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation-reclearing plan would be developed for each transmission line segment based on the results of the periodic inspections described above. Given the land use in the area of this project, right-of-way maintenance is expected to be minimal. The two principal management techniques are mechanical mowing, using tractor-mounted rotary mowers, and herbicide application. Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the right-of-way and mechanical mowing is not practical. Herbicides would be selectively applied from the ground with backpack sprayers or vehicle-mounted sprayers.

Any herbicides used would be applied in accordance with applicable state and Federal laws and regulations and the commitments listed in this document. Only herbicides registered with the USEPA would be used. Appendix V contains a list of the herbicides and adjuvants (ingredients added to the herbicide solution to increase its effectiveness) currently used by TVA in right-of-way management. This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

Other than vegetation management, little other maintenance work would normally be required. The transmission line structures and other components typically last several decades. In the event that a structure must be replaced, the structure would normally be lifted out of the ground by crane-like equipment and the replacement structure inserted into the same hole or an immediately adjacent hole. Access to the structures would be on existing roads where possible. Replacement of structures may require releveling the area surrounding the replaced structures, but there would be little, if any, additional area disturbance when compared to the initial installation of the structure.

2.5. Project and Siting Alternatives

The process of siting this transmission line followed the basic steps used by TVA to determine a transmission line route.

- Determine potential existing power sources to supply the substation.
- Define the study area.
- Collect data to minimize potential impacts to cultural and natural features.
- Develop general route options and potential routes.
- Gather public input.
- Incorporate public input into the final identification of the transmission line route.

2.5.1. Definition of Study Area

The first task in defining the study area was to identify the power sources that could supply the identified need. The most practical power source was the South Jackson-South Memphis 161-kV Transmission Line and was located approximately 6 miles south of the proposed substation. Therefore, based on this location, the study area was defined as an area that encompasses approximately 19.7 square miles or 12,620 acres and is located entirely within Fayette County (Figure 1-2). The study area boundary consists of the Fayette/Shelby County line to the west, SWTEMC's proposed Gallaway Substation to the north, Ivy Drive to the east, and the South Jackson-South Memphis 161-kV Transmission Line to the south.

A geographic information system (GIS) based routing map and color orthophotography were developed. The GIS data generated a "constraint" model that served to guide the routing process by identifying obvious routing conflicts or sensitive areas including, but not limited to, houses, rivers, historical sites, and wetlands (Figure 1-2). Following is a brief description of other aspects of the study area:

- Natural and Cultural Features: The study area is characterized by gently rolling land, approximately 60 percent agricultural and 40 percent forested. There are numerous residential areas along several county roads and more development is currently underway. Avoiding these areas was a primary consideration for transmission line routing. A second consideration was the low floodplain area of the Little Cypress Creek and Loosahatchie River located in the northern portion of the study area. U.S. Interstate 40 (I-40) runs northeast to southwest approximately 4 miles north of the South Jackson-South Memphis 161-kV Transmission Line. The Johnsonville-Cordova 500-kV Transmission Line bisects the southern portion of the study area. Hickory Withe Road runs north and south through the study area.

- Land Use: The majority of the land within the study area was previously used for agriculture and forestry. The study area currently consists primarily of a combination of agricultural fields (cotton, soybeans, and sod), pasturelands, old fields, clear-cuts, and residential areas. There are several tracts of forested bottomland in the study area, primarily along the Little Cypress Creek and Loosahatchie River drainage canal. The two largest population centers are Hickory Withe and Gallaway.

- Transportation: Major transportation routes in the study area include I-40, SR 196, and Hickory Withe Road. Other roads include Harrell Drive, Donelson Drive, Orr Road, and Grimes Road.

2.5.2. Collect Data

Geographic data, such as topography, land use, transportation, environmental features, cultural resources, near-term future development, and land conservation information were collected for the entire study area. Analysis of the data was aided by using a 1:100,000 GIS database for regional opportunity and constraint analysis, while a 1:24,000 database was developed for more complex computations, such as acreage of wetlands and percent slope. GIS displays and analyzes multiple layers of information simultaneously using geographically referenced digital information.

Maps were created to show regional opportunities and constraints clearly. Sources included 1 inch = 500 feet aerial photography, county tax maps/property boundaries, United States Geological Survey (USGS) digital line graphs, digital elevation models, National Wetlands Inventory, and cultural resource data, among others. Aerial photography was interpreted to obtain land use and land cover data, such as forests, agriculture, wetlands, houses, barns, commercial and industrial buildings, churches, and cemeteries. Data were analyzed both manually and with GIS. Manual calculations from aerial photographs, tax maps, and other sources included the number of road crossings, stream crossings, and property parcels.

Using this system, TVA developed and evaluated numerous options and scenarios in the study area to determine the route or routes that would best meet project objectives, including avoiding or reducing potential environmental impacts.

2.5.3. Develop General Route Options and Potential Routes

From the information gathered during the system's studies and data development phases, seven tap-point options were identified from the South Jackson-South Memphis 161-kV Transmission Line to the new SWTEMC substation located on the south side of the CSX Railroad and just east of SR 196. Seven major transmission line routes and several alternate segments were evaluated to determine the preferred tap point and transmission line route (Figure 1-2).

Route A would begin on the South Jackson-South Memphis 161-kV Transmission Line at a tap point between structures 133 and 134 located about 800 feet west of Cherry Road. From the tap point, Route A would continue west past a private lake south of Donelson Drive. At a point west of the lake, the route would fork into West Route A and East Route A options. West of the Lynn Road intersection, West Route A would cross under the Johnsonville-Cordova 500-kV Transmission Line about 200 feet east of structure 511 and Donelson Drive. It would then turn north and run along property lines to a point south of the north tributary to Hall Creek. At this point West Route A would turn northeast to a point just east of Harrell Drive where it would converge with East Route A and continue on a common path to the proposed substation. East Route A would follow property lines and run a parallel path about 1700 feet to the east of the proposed West Route A option. East Route A would cross the 500-kV transmission line between structures 509 and 510 and would continue north rejoining the West Route A option near Harrell Drive.

Route A would continue northeast past Harrell Drive about 0.5 miles before it would turn due north along property lines. The route would continue north, cross I-40 and Hickory Withe Road, and then parallel the west side of SR 196 until it crossed the Loosahatchie River. Continuing north, the route would then parallel the east side of SR 196 turning northeast on the south side at the CSX Railroad intersection to the substation at Gallaway. Route A would be about 6.5 miles in length.

The tap point for Route B would be located between structures 136 and 137 on the South Jackson-South Memphis 161-kV Transmission Line off Donelson Drive (Figure 1-2). From the tap point, Route B would continue north along property lines crossing Harrell Drive and the 500-kV transmission line near structure 502. Angling north/northwest, it would cross Weber Branch and then parallel Orr Road north to cross I-40 before turning northwest parallel to Hickory Withe Road. At SR 196, it would turn north and join the same route as described for Route A into the proposed Gallaway Substation. This route would be approximately 5.9 miles long.

The tap point for Route C would be located on Harrell Road about 0.25 mile west of Hickory Withe Road between structures 140 and 141 of the South Jackson-South Memphis 161-kV Transmission Line. From the tap point, the route could go north or west. The western route would follow along Harrell Road about 0.8 mile and then join the proposed Route B after it crossed the 500-kV transmission line near structure 502. The northern route, after approximately 1000 feet, would join the proposed Route D (Figure 1-2). This route would be about 5.9 miles long.

The tap point for Route D would be located just north of the new Hickory Withe Substation on Hickory Withe Road between structures 141 and 142 (Figure 1-2). Route D would proceed northwest from the tap point for about 150 feet, turn due west 1200 feet along a property line, intersect with the Route C option and turn north following property lines. Shortly before crossing the 500-kV transmission line near structure 499, it would turn northwest, continue for about 0.5 mile crossing Weber Branch, then turn due north following property lines until it reached Hickory Withe Road. Route D would then follow Hickory Withe Road northwest about 1500 feet before splitting into two D route options (Figure 1-2). East Route D would turn north at this point, cross I-40 and continue to a point about 250 feet south of the Loosahatchie River before angling northwest parallel to the river and joining Route A just north of the Loosahatchie River at SR 196. West Route D would continue along Hickory Withe Road, cross I-40, and turn north at an unnamed road. The route would then proceed north until a point about 250 feet south of the Loosahatchie River, where it would follow the same route northeast as East Route D. This route would be approximately 5.9 miles in length.

The tap point for Route E would be located just east of Hickory Withe Road between structures 142 and 143 (Figure 1-2). From the tap point, the path would go north along Hickory Withe Road, crossing under the 500-kV transmission line near structure 497. It would then continue along Hickory Withe Road to Weber Branch, turn north crossing Weber Branch, then northwest to a point about 400 feet south of the Loosahatchie River near I-40. From here, the route would turn west/northwest and parallel approximately 250 feet south of the Loosahatchie River, cross I-40, and rejoin with the Route D option. This route would be about 5.7 miles long.

The tap point for Route F is located between structures 144 and 145 of the South Jackson-South Memphis 161-kV Transmission Line (Figure 1-2). From the tap point, the route

would go north following property lines, crossing Fields Drive and the 500-kV transmission line near structure 494. It would then continue northward along property lines until reaching Braden Road. Here, the route would turn northwest and continue until rejoining Route E at a point southeast of I-40. The route would then continue to the proposed substation in Gallaway. This route would be about 5.9 miles in length.

The tap point for Route G would be located between structures 147 and 148 of the South Jackson-South Memphis 161-kV Transmission Line (Figure 1-2). From the tap point, Route G would go northward, cross Fields Drive and the 500-kV transmission line near structure 493, and continue about 1800 feet to an intersection with Route F. The route would then continue to the proposed Gallaway Substation. This route would be approximately 5.7 miles long.

2.5.4. Establish and Apply Siting Criteria

TVA has long employed a set of evaluation criteria that represent opportunities and constraints for development of transmission line routes. The criteria are oriented toward factors such as existing land use, ownership patterns, environmental features, cultural resources, and visual quality. Cost is also an important factor, with engineering considerations and right-of-way acquisition cost being the most important elements. Information gathered and comments made at the public meeting and subsequent comment period were taken into account, while refining criteria to be specific to the study area.

Each of the transmission line route options was evaluated according to these criteria relating to engineering, environmental, land use, and cultural concerns. Specific criteria are described below; for each category described, a higher score means a bigger constraint. For example, a greater number of streams crossed, a longer transmission line route length, or a greater number of historic resources affected would give a transmission line route option a worse score.

- *Engineering Criteria*: total length of the transmission route, length of new right-of-way and rebuilt right-of-way, primary and secondary road crossings, pipeline and transmission line crossings, and total line cost

- *Environmental Criteria*: slopes greater than 30 percent (steeper slopes mean more potential for erosion and potential water quality impacts), slopes between 20 and 30 percent, visual aesthetics, forested acres, open water crossings, sensitive stream (those supporting endangered or threatened species) crossings, perennial and intermittent stream crossings, wetlands, rare species habitat, natural area crossings, and wildlife management areas

- *Land Use Criteria*: the number of fragmented property parcels, schools, houses, commercial or industrial buildings, barns, and parkland crossings

- *Cultural Criteria*: archaeological and historic sites, churches, and cemeteries

Scores for each of the options were calculated by adding individual criterion values for each transmission line route. The resulting sum values were evaluated using standard statistical techniques and were assigned a ranking from 1 to 4 for each route in each subcategory (engineering, environmental, land use, and cultural).

A weighted score was produced for each transmission line route in each subcategory. This made it possible to understand which routes would have the lowest and highest impacts on engineering, environmental, land use, and cultural resources. Finally, to determine total impacts, the scores from each category were combined for an overall score.

2.5.5. Route Evaluation and Selection

Following the public open house and subsequent comment period, each tap point and route option was evaluated using the updated constraint model along with the modified routing criteria obtained during the public involvement.

Visibility and land use were the two most important concerns of the private landowners who attended the public meeting or submitted comments. TVA learned that the Tennessee Department of Transportation (TDOT) has plans to construct an interchange on I-40. In addition, one landowner had concerns about the effect of the transmission line on his pivot irrigation systems, which are located south of the Loosahatchie River. Consequently, the alternative route options were modified to avoid future conflicts related to these issues.

The pivot irrigation systems are located between SR 196 and I-40 and are shown on Figure 1-2. The transmission line structures would interfere with the operation of these systems, and the water sprayed during operation could cause outages in the transmission line if it were to hit the conductor. Therefore, it was essential that the transmission line route not fall within the boundaries of these irrigation systems. Routes A and B would be affected by these systems north of I-40. The section of transmission line that would run parallel to the Loosahatchie River and would be shared by six of the route options was relocated to the north side of the river to avoid the pivot irrigation system.

In addition to the pivot irrigation system, Route A would cross twice the forested area as the other options and received more opposition from property owners. Route A would be about 0.5 mile longer than the other options and would require the construction of a new gravel access road to provide TVA access to the switches. For these reasons, Route A was not selected as the preferred route option.

Route B (which also includes the west path of Route C) would also be affected by the pivot irrigation. Visual impacts would occur along the 1.5 miles it would parallel Orr Road and potential construction problems could occur along the road due to the presence of existing distribution lines and underground facilities. Route B would cross the future TDOT interchange near the intersection of Hickory Withe Road, Orr Road, and I-40. The tap point location for Route B would require a new gravel access road. For these reasons, Route B was rejected as the preferred route option.

The proposed northern route for Route C and Route D are essentially the same: The northern C route turns into D after approximately 1000 feet. Both tap points are favorable in that they would enable TVA to utilize existing roads to access the switches. These routes were the preference of the majority of property owners, primarily because the majority of these two routes followed property lines and therefore minimized land use impacts. These routes would also minimize impacts on the pivot irrigation systems, which became a primary concern following the public meeting. The tap point for Route D, located at Chickasaw EC's Hickory Withe 161-kV Substation, would allow TVA to tap in both directions as well as eliminate one switch structure. Furthermore, this location was preferred over the tap point for Route C by the landowner, who owns both property tracts.

Route E would cause construction and visibility issues similar to Route B because it would follow Hickory Withe Road for approximately 1.5 miles. Preliminary studies indicated that it would cross approximately 12.5 acres of forested wetlands. Furthermore, these studies indicated that Route E would impact many more houses (12) within 300 feet than the other route options. Not surprisingly, Route E faced very strong opposition from property owners, because it would pass through existing and future development along Hickory Withe Road. For these reasons, Route E was not selected as the preferred route option.

Routes F and G would traverse a very low and wide floodplain along the Loosahatchie River that could lead to construction and operational problems due to high water and wetland concerns. Further fieldwork indicated that Routes F and G would cross 16 and 12.5 acres, respectively, of forested wetland areas. Finally, both tap point locations would require new, very long, access roads. For these reasons, Routes F and G were eliminated from consideration.

2.6. Identification of the Preferred Alternative

Alternative 2: Construct Transmission Line is TVA's preferred alternative. TVA would provide a 161-kV tap to the planned Gallaway Substation along Route D, which is TVA's preferred route option. After the public information day and landowner comments were received, Route D was modified and overall scoring then indicated it as the best Alternative 2 route option for minimizing impacts. All of the other route options were eliminated from further review or consideration.

Two changes were made to the proposed Route D. First the transmission line was moved to the north side of the Loosahatchie River to avoid the pivot irrigation and second, the route was modified in the Hickory Withe Road area at the request of a property owner to follow along the property line as much as possible and still avoid a large forested wetland and the planned I-40 interchange (Figure 1-1). Route D, as described in Section 2.5.3 and as modified by these two changes, is 5.8 miles in length, affects approximately 70 acres, and represents the TVA preferred route for this proposed project.

2.7. Summary of Mitigation Measures

The following routine measures identified in this EA would be applied during construction and operation of the proposed transmission line:

- Best Management Practices as described in Muncy (1999)
- Environmental quality protection specifications as described in Appendixes II-IV

CHAPTER 3

3. AFFECTED ENVIRONMENT

3.1. Introduction

Chapter 3: Affected Environment succinctly describes the existing condition of the environmental resources and factors of the Fayette County, Tennessee, area that would affect or that would be affected by implementing either Alternative 1 or Alternative 2.

This description of the existing environment in Chapter 3, the description of the activities of Alternative 1: Do Not Build Additional Transmission Line (No Action) in Chapter 2 and the predicted effects of Alternative 1 in Chapter 4 combine to establish the baseline conditions against which the decision maker and the public can compare the potential effects of Alternative 2: Construct Transmission Line.

3.2. Alternative 1 – Do Not Build Additional Transmission Line (No Action)

If TVA decided not to build the proposed transmission line, SWTEMC would continue at the current transmission capabilities, which are projected to be exceeded by 2005. Outage rates, measured as the average number of minutes a typical customer experiences in a year, would not improve. In addition, with current growth projections, an overloading of the SWTEMC system in Fayette County is anticipated due to the increasing load demands by ongoing and already planned development. This would result in an increase in system outages, especially at times of high electricity use and could occur as early as 2005. SWTEMC could decide to build the transmission line itself to connect to its new substation. SWTEMC has not indicated that it would do this and if it did, the potential impacts would be similar to those described below if TVA built the transmission line.

3.3. Alternative 2 – Construct Transmission Line

3.3.1. Terrestrial Ecology

3.3.1.1. Terrestrial Plants

The identified transmission line route occurs within the East Gulf Coastal Plain Physiographic Province (Fenneman, 1938), which is characterized by flat to undulating topography divided by the many streams and river bottoms. Botanically, the project occurs in the Mississippi Embayment Section of the Western Mesophytic Forest Region (Braun, 1950). A diverse mix of oak-hickory forests, swamp forests, mixed mesophytic communities, and prairie occur in this region. Various oak, hickory, and elm species dominate the landscape.

The project route can be characterized as having two vegetation types: grass forbs habitats and mixed bottomland forests.

Grass forbs habitats include lands that are in the early successional stage and are lands predominantly maintained as managed pastures, row crop agricultural lands, thickets intergrading into immature forests, lawns, and old fields. This habitat type occupies at least

60 percent of the route evaluated. Managed pastures and old fields are heavily dominated by Johnson grass and Bermuda grass. Additional representative grass species include broom-sedge, Japanese stilt grass and river oats. Representative species of forbs within this vegetation type include sericea lespedeza, thistle, dog fennel, fleabane, and goldenrod. Thicket areas intergrading into immature forests consists mainly of Japanese honeysuckle, smooth sumac, honey locust, and Chinese privet, with immature species of eastern red cedar and tulip poplar dispersed sporadically. The edges of most of this habitat are covered in the exotic kudzu vine. Row crop agricultural lands are composed primarily of cotton and corn with sporadic occurrences of Indian heliotrope and sedges. On the periphery of the row crops, kudzu, Johnson grass, partridge pea, and fleabane are prolific. Most of the access roads would be located at the edges of the row crop agricultural lands.

Mixed bottomland forests occupy approximately 40 percent of the route evaluated. These areas are along streams, floodplains, and the Loosahatchie River drainage canal. Common trees include eastern red cedar, American elm, smooth elm, winged elm, swamp chestnut oak, black oak, sycamore, persimmon, and red maple. Common understory vegetation includes Chinese privet, honey locust, and red mulberry. Dominant herbaceous groundcover species include false nettle, touch-me-not, lizard's tail, white avens, and Japanese stilt grass.

In addition to the transmission line route, there would be a 3-acre construction laydown yard. The proposed laydown area consists of mostly grass forbs comprised of mainly slender plantain, crabgrass, and Johnson grass.

The plant communities observed along the proposed project route and laydown area are common and representative of the region. No uncommon plant communities of state significance were observed on the proposed transmission line route or laydown area.

3.3.1.2. Invasive Plant Species

About 60 percent of the proposed project is on land in which the native vegetation has been extensively altered as a result of previous land use history (e.g., clear-cuts, grass-dominated areas maintained by mowing and grazing). Invasive exotic species encountered along the proposed route include Chinese privet, sericea lespedeza, Japanese stilt grass, Japanese honeysuckle, Johnson grass, and kudzu. All of these species have the potential to impact native plant communities adversely, because of their potential to spread rapidly and displace native vegetation.

3.3.1.3. Terrestrial Animals

Habitats observed in the Gallaway project area have been largely impacted by previous agricultural and forestry practices within the region. Two primary habitat types were observed along the proposed transmission corridor—early successional habitats and several tracts of mixed bottomland forests.

The proposed corridor route consists predominantly of early successional habitats, a combination of agricultural fields (cotton, soybeans, and sod), pasturelands, old fields, clear-cuts, and residential areas. Wildlife species observed during field surveys include white-tailed deer, raccoon, and ground skink. Common bird species include red-tailed hawk, turkey vulture, chimney swift, killdeer, barn swallow, northern mockingbird, indigo bunting, eastern meadowlark, and mourning dove. Other species commonly found in these

habitats include eastern cottontail, house mouse, Virginia opossum, big brown bat, eastern bluebird, and American goldfinch.

Several tracts of mixed bottomland forest occur along the proposed transmission line route, primarily along the Little Cypress Creek and the Loosahatchie River drainage canal. Animal species found include white-tailed deer, raccoon, nine-banded armadillo, eastern mole, American toad, Fowler's toad, southern leopard frog, painted turtle, and common snapping turtle. Common bird species encountered include eastern tufted titmouse, northern cardinal, yellow-billed cuckoo, American crow, blue jay, Carolina chickadee, and red-eyed vireo. Other terrestrial animals likely to occur in the forested areas include eastern cottontail, gray squirrel, eastern chipmunk, white-footed mouse, red bat, wild turkey, slimy salamander, ground skink, five-lined skink, black rat snake, and eastern box turtle.

House sparrow, European starling, and rock pigeon are examples of introduced animal species abundant in these areas; these species reduce habitat availability for native species in the project area.

3.3.2. Threatened and Endangered Terrestrial Species

3.3.2.1. Terrestrial Plants

The TVA Natural Heritage database indicated that no federally listed and two Tennessee state-listed plant species have been reported from within 5 miles of the proposed transmission line route and laydown area (Table 3-1). TVA's Natural Heritage database is information that TVA maintains about listed and sensitive species in coordination with the U.S. Fish and Wildlife Service and state agencies' Divisions of Natural Heritage.

Table 3-1. State-Listed Plant Species Reported From Within 5 Miles of the Proposed Transmission Line Route

Common name	Scientific name	Federal status	State status
Nodding rattlesnake root	*Prenanthes crepidinea*		END
Cedar elm	*Ulmus crassifolia*		SPCO

Status abbreviations: END = endangered; SPCO = Special Concern

No occurrences of these or other rare plant species were observed on or immediately adjacent to the proposed transmission line route or laydown area during field surveys.

3.3.2.2. Terrestrial Animals

The TVA Natural Heritage database indicated that no federally listed and five Tennessee state-protected animal species have been reported from Fayette County. An additional state-protected species was recorded within the 3-mile radius of the project area in nearby Shelby County (Table 3-2).

Table 3-2. State-Listed Animal Species Reported From Fayette County, Tennessee, and Within a 3-Mile Radius of the Project Area

Common name	Scientific name	Federal status	State status
Amphibian			
Barking tree frog	*Hyla gratiosa*	-	NMGT
Bird			
Bachman's sparrow	*Aimophila aestivalis*	-	END
Swainson's warbler	*Limnothlypis swainsonii*	-	NMGT
Mammals			
Southeastern shrew	*Sorex longirostris*	-	NMGT
Southern bog lemming	*Synaptomys cooperi*	-	NMGT
Meadow jumping mouse	*Zapus hudsonius*	-	NMGT

Status abbreviations: END = endangered; NMGT = Deemed In Need of Management

Barking tree frogs are associated with wetland habitats. Individuals aggregate in permanent water during the breeding season, but spend warm months in treetops and the dry or winter months burrowed under vegetation. Although several streams cross in the project area, very little wetland habitat exists on the proposed transmission line route. Due to the lack of suitable habitat, it is unlikely that this species inhabits the project area.

The Bachman's sparrow, endemic to the southeastern United States, inhabits savannahs with grassy openings and mature trees, usually pines. Suitable habitat for this species does not exist in the project area.

The Swainson's warbler is a summer resident that occupies bottomland forests with dense, woody understory habitat in West Tennessee. A secretive bird, this species was not found during field visits; however, habitat does exist in the project area.

Southeastern shrews, southern bog lemmings, and meadow jumping mice all inhabit a wide variety of habitats ranging from grasslands to forests, but usually prefer moist woodland areas near wetlands, bogs, or streams. Although these species were not observed during field visits, they may find suitable habitat in the tracts of mixed bottomland forest along the proposed transmission line route.

No other federally or state-listed species or their habitats are expected to occur within the proposed project area.

3.3.2.3. Aquatic Animals

The TVA Natural Heritage database indicated that no federally listed and one Tennessee state-listed fish species, northern madtom (*Noturus stigmosus*), deemed in need of management, is known to occur in the Loosahatchie River system. This species has not been reported from any of the streams that would be crossed by the proposed transmission line; however, suitable habitat is present.

3.3.3. Wetlands

Activities in wetlands are regulated under Sections 404 and 401 of the Federal Clean Water Act. EO 11990 (Protection of Wetlands) also applies to some Federal activities. To

conduct activities in “jurisdictional” wetlands, a nationwide general permit or an individual permit from the United States Army Corps of Engineers (USACE) is required. State Water Quality Certification or an individual Aquatic Resource Alteration Permit issued by the Tennessee Department of Environment and Conservation (TDEC) is also required. EO 11990 requires all Federal agencies to provide leadership and to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. It also requires agencies to consider factors relevant to a proposal’s effect on the survival and quality of the wetlands. Among these factors considered are the maintenance of natural systems, conservation, and long-term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources, as well as other uses of the wetlands.

Wetland determinations were performed in the proposed project area according to USACE standards (Environmental Laboratory, 1987), which require documentation of hydrophytic vegetation (Reed, 1997), hydric soil, and wetland hydrology. Wetlands are classified according to the Cowardin system for the classification of wetlands and deepwater habitats (Cowardin, et al., 1979).

Four wetlands, totaling approximately 3.8 acres, were initially identified in the proposed transmission line right-of-way. Following the wetland survey, the proposed route was relocated to avoid crossing the largest wetland area, which consisted of approximately 0.5 acre of emergent wetland and 2 acres of forested wetland. As a result of the transmission line route relocation, the number and acreage of wetlands in the right-of-way was reduced to three wetlands totaling 1.2 acres (Table 3-3).

Table 3-3. Wetlands Located Within the Proposed Gallaway Transmission Line Tap Right-of-Way

Wetland ID	Wetland classification*	Watershed location	Approximate linear feet and acreage in right-of-way**
W1	PSS1/PEM1E	Isolated swale/ Weber Branch	15 feet / 0.02 acre
W2	PSS1E	Floodplain/ Weber Branch	100 feet / 0.2 acre
W3	PFO1E	Unnamed tributary bottomland/ Weber Branch	450 feet / 1.0 acre

*As defined by Cowardin, et al. (1979).
**Acreage varies with the width of the wetland in the right-of-way (50 feet to 100 feet).

The primary function performed by Wetland W1, an isolated swale with no apparent surface water connection, is provision of amphibian breeding habitat. The functions performed by Wetlands W2 and W3 include attenuation of flood flows, nutrient cycling, contaminant removal and transformation, sediment retention, wildlife habitat, and maintenance of biological and landscape diversity. The ecological and economic values provided by these functions include sustaining wildlife and aquatic resources, flood control, water quality improvement and maintenance, preservation of biodiversity, and ecosystem support (via nutrient cycling, biomass production, and nutrient export).

The three wetlands met three USACE parameters for wetlands, which may be regulated under the Clean Water Act. A USACE jurisdictional determination would be necessary to determine if all of the wetlands are under Federal jurisdiction. The wetlands identified in the project area met the parameters for wetlands that may be regulated by TDEC.

3.3.4. Aquatic Ecology

The proposed transmission line is located in the Coastal Plain Physiographic Province within the Loosahatchie River drainage, a direct tributary of the Mississippi River. Many of the streams in this area, including the Loosahatchie River, have been channelized over the past 50 to 70 years and had their riparian forests removed to "improve" drainage of agricultural lands (Etnier and Starnes, 1993). Streams in most of this region are characterized by Etnier and Starnes (1993) as low gradient, soft-bottomed (predominantly silt with some sand), turbid or murky, and in the natural state, have extensive bottomlands with seasonally flooded swamp areas. Etnier and Starnes (1993) identified 135 fish species that occur in the Mississippi River drainage of the Coastal Plain Physiographic Province. While not all of these species are known from Fayette County or the portion of the Loosahatchie River drainage potentially impacted by transmission line construction, many of them could occur in areas of suitable habitat.

Field investigations of the proposed right-of-way conducted in July 2004 identified 40 perennial, intermittent, and wet-weather conveyance watercourses (Appendix VI). Some of these transmission line crossings involve more than one channel in close proximity to each other, and in other locations, streams lie parallel to or meander within the proposed right-of-way. Larger named streams that could be impacted by the proposed transmission line route are the Loosahatchie River, and its tributaries Little Cypress Creek and Weber Branch.

3.3.5. Managed Areas

The TVA Natural Heritage database indicated that the proposed transmission line route would not be located within or immediately adjacent to any Managed Areas or Ecologically Significant Sites. Additionally, no such areas occur within 5 miles of the proposed project area. There are no streams listed on the Nationwide Rivers Inventory in Fayette County, Tennessee.

3.3.6. Recreation

The proposed transmission line right-of-way crosses the Loosahatchie River canal. The canal supports very limited recreational boating and recreational fishing.

Other recreational activities in the area are generally unorganized and dispersed and occur on private land. Activities consist of deer and small game hunting, recreational target shooting and wildlife viewing.

3.3.7. Floodplains

The proposed transmission line right-of-way crosses the identified 100-year floodplain of the Loosahatchie River in Gallaway, Tennessee, and the identified 100-year floodplain of the Loosahatchie River and several minor floodplain areas in Fayette County, Tennessee.

3.3.8. Groundwater

The project area is underlain by the Mississippi embayment aquifer system and is part of the Coastal Plain Physiographic Province. The Mississippi embayment aquifer system consists of six aquifers and two confining units of Tertiary and Cretaceous ages (Lloyd and Lyke, 1995). These six aquifers are the upper, middle, and lower Wilcox; the lower and middle Claiborne; and McNairy-Nacatoch (Lloyd and Lyke, 1995).

Of these six aquifers, the middle Claiborne aquifer is a major source of groundwater in the Mississippi embayment aquifer system and is in direct hydraulic connection with the underlying lower Claiborne-upper Wilcox aquifer. Together, these three aquifers make up the Memphis sand aquifer, which consists of thick beds of fine to coarse sand interbedded with thin layers of lignite, clay, and silt. The Memphis Sand is the primary source of water supply for much of western Tennessee (Lloyd and Lyke, 1995). Recharge to the middle Claiborne and the lower Wilcox aquifers are by precipitation on aquifer outcrop areas and by downward leakage from overlying aquifers. Because the outcrop area of the lower Wilcox aquifer is small, the primary source of recharge to this aquifer is downward leakage. Discharge from all aquifers in the system is mainly to streams in outcrop areas or to the Mississippi River Valley. In the deeper, confined parts of the aquifers, upward leakage to shallower aquifers occurs (Lloyd and Lyke, 1995).

Water quality from the aquifers in the Mississippi embayment aquifer system generally is suitable for most uses. Water in these aquifers is soft to moderately hard and is usually a calcium bicarbonate type in aquifer outcrop areas. As the water moves deeper into the aquifers, it becomes a sodium bicarbonate type. Dissolved-solids concentrations usually are less than 250 milligrams per liter; however, concentrations increase as the water moves along flow paths into deeper parts of the aquifers (Lloyd and Lyke, 1995).

Groundwater is the major source for water supply in the western counties of Tennessee. All but one of Fayette County's seven community water sources is from groundwater wells. Of the six groundwater sources supplying the county, five were found by the Tennessee Division of Water Supply to be of high susceptibility (the potential for contamination of the raw water source at levels above drinking water standards or other health-based concerns) under the Source Water Assessment Report. The state considers the West Tennessee Memphis sand aquifer to be particularly vulnerable to contamination (TDEC, 2003). Total fresh groundwater withdrawals from Fayette County, Tennessee, during 1995 were about 5.87 million gallons per day (USGS, 1995).

3.3.9. Surface Water

Precipitation in the project area averages about 52 inches per year with the wettest month in April at 5.5 inches and the driest month in October at 3.0 inches. The average annual air temperature is 62 degrees Fahrenheit, ranging from a monthly average of 40 degrees Fahrenheit in January to 83 degrees Fahrenheit in July. Stream flow varies with rainfall and averages about 20 inches of runoff per year or approximately 1.5 cubic feet per second per square mile of drainage area.

The project area drains to the Loosahatchie River of the Mississippi River via direct runoff, the Little Cypress Creek (and Cane Creek), and Weber Branch. The receiving streams are classified by the state (TDEC, 2004) for fish and aquatic life, recreation, irrigation, and livestock watering and wildlife. The Loosahatchie River in the project area is on the state

303 (d) list as partially supporting its designated uses due to other habitat alterations from channelization.

3.3.10. Visual

The physical, biological, and cultural features of an area combine to make the visual landscape character both identifiable and unique. Scenic integrity indicates the degree of unity or wholeness of the visual character. Scenic attractiveness is the evaluation of outstanding or unique natural features, scenic variety, seasonal change, and strategic location. Where and how the landscape is viewed would affect the more subjective perceptions of its aesthetic quality and sense of place. Views of a landscape are described in terms of what is seen in foreground, middleground, and background distances. In the foreground, an area within 0.5 mile of the observer, details of objects are easily distinguished in the landscape. In the middleground, normally between 1 mile and 4 miles from the observer, objects may be distinguishable, but their details are weak and they tend to merge into larger patterns. Details and colors of objects in the background, the distant part of the landscape, are not normally discernible unless they are especially large and standing alone. The impressions of an area's visual character can have a significant influence on how it is appreciated, protected, and used. The general landscape character of the study area is described in this section with additional details in Section 4.3.10.

Visual resources are evaluated based on existing landscape character, distances of available views, sensitivity of viewing points, human perceptions of landscape beauty/sense of place (scenic attractiveness), and the degree of visual unity and wholeness of the natural landscape in the course of human alteration (scenic integrity).

The proposed transmission line route would begin just north of the small community of Hickory Withe, Tennessee. From this proposed point of connection to TVA's existing South Jackson–South Memphis 161-kV Transmission Line, the transmission line route would extend northward through the rural Fayette County countryside almost 6 miles, terminating in the rural community of Gallaway, Tennessee. Along the proposed route from its connection point to its terminus, the scenic attractiveness is common, and the scenic integrity ranges from low to moderate.

The proposed connection point lies near the crossing of TVA's South Jackson–South Memphis 161-kV Transmission Line and Hickory Withe Road (SR 196), a north/south roadway that receives a modest amount of traffic. An existing low-voltage transmission line with wooden-pole transmission structures parallels the roadway. The topography is gently sloping and vegetation is mixed within this section, as dense hardwood areas compete with agricultural fields and scattered residential areas. From the connection point, the proposed route travels east and then northeast along the edges of mature hardwood tree lines before resuming a northerly direction and crossing the more moderately sloping farmland topography. Views are concentrated within the foreground (0 feet to 0.5 mile from the observer) viewing distance, as the minimal change in topography precludes views from farther vantage points.

As the proposed route turns northward along the tree line, vegetation patterns change to the west, as views remain confined to the foreground viewing distance due to the surrounding topography and vegetation. A few private residences and farmsteads are lightly scattered about the gently rolling hills. The existing landscape character is chiefly agricultural, with noticeable areas of rural residential development. The proposed route

continues in this manner for 0.5 mile before reaching the existing Johnsonville–Cordova 500-kV Transmission Line, where large transmission structures and appurtenances are currently visible.

From this point, the proposed route travels in a northwesterly direction for almost 1 mile through open agricultural and forested lands and crosses Weber Branch, a small tributary stream of the Loosahatchie. The topography remains consistent, preventing views from the middleground (0.5 mile to 4 miles from the observer) and background (4 miles and beyond from the observer) viewing distances.

Upon reaching a clearing in the woodland range, several expansive homesites become visible in the foreground viewing distance. Orr Road, which chiefly services the rural residential areas on opposing sides, parallels the proposed route in this section as it travels in a north/south direction. Grimes Road, which winds toward the proposed route from the east, is obscured from view due to dense mature vegetation. Before turning to cross Hickory Withe Road, the proposed route passes within foreground of approximately eight to ten homesites along a background of mature vegetation. Views within this section remain in context with the pastoral and rural residential setting.

At the Hickory Withe Road crossing, the proposed route turns to a northeasterly direction for just over 0.1 mile. Private residences, modest forestland, and open farm and grazing land, which typify the existing landscape character along the proposed route, are visible within the foreground along Hickory Withe Road.

The proposed transmission line route resumes a northerly course after entering a small wooded area where the topography lessens slightly and continues across two open agricultural fields before approaching I-40. Private land surrounds and Hickory Withe Road lies to the east, partially screened by mature vegetation. Upon crossing the arterial highway, which is buffered on opposing sides by mature vegetation, the proposed route travels north and then northeast amidst dense vegetation. The Loosahatchie River canal parallels the proposed route just to the southwest with a buffer of mature vegetation along its banks. Forest cover gives way to cropland approaching Loosahatchie Road (SR 196) and views are available intermittently through the roadside vegetation.

The proposed route turns sharply upon reaching Loosahatchie Road and closely follows the roadway where agricultural fields are visible in the foreground of mature forestland to the east, and dense vegetation lies in the immediate foreground to the west of the roadway. At the Little Cypress Creek canal crossing, the eastern roadside vegetation gives way, allowing for increased views of the expansive fields beyond. A water treatment plant is visible to the west only briefly to motorists near this crossing as vegetation thickens before reaching the industrial area to the north at the outskirts of the small town of Gallaway.

Nearing the town of Gallaway and as the vegetation thins to the west, a large light industrial area as well as the local fire service is visible in the near foreground. Farther to the north, the beginnings of a residential area are visible as the scattered development transitions westward to the rural Gallaway downtown area. Cropland ranges to the east amidst a background of mature vegetation as Loosahatchie Road parallels the raised railroad bed while it stretches to the northeast and out of sight.

3.3.11. Cultural Resources

The West Tennessee uplands have been an area of human occupation for the last 12,000 years. In this area, prehistoric chronology is generally broken into five broad time periods: Paleo-Indian, Archaic, Gulf Formational, Woodland, and Mississippian. Prehistoric land use and settlement patterns vary during each period, but short- and long-term habitation sites are generally located on floodplains and alluvial terraces along rivers and tributaries. Specialized campsites tend to be located on older alluvial terraces and in the uplands. Settlement of this area began as early as 1820, and Fayette County was established on September 29, 1824. The county's economy has been based on agriculture production, primarily corn and cotton; however, recently soybeans, beef cattle, dairying, and egg production have becoming become important cash crops. Although Fayette County remains a rural, agricultural area, it is now in a transition period as it faces the suburban sprawl from nearby Memphis and the surrounding cities such as Germantown and Collierville (Morton, 1998).

Section 106 of the NHPA requires Federal agencies, including TVA to: (1) consider the effect of its actions on historic properties and (2) allow the Advisory Council on Historic Preservation an opportunity to comment on the action. Section 106 involves four steps: (1) initiate the process; (2) identify historic properties; (3) assess adverse effects; and (4) resolve adverse effects. This process is carried out in consultation with the State Historic Preservation Officer (SHPO) of the state in which the undertaking takes place and other consulting parties including federally recognized Native American tribes.

Archaeological sites, historic sites, and historic structures are evaluated in terms of their ability to meet the criteria for eligibility for the National Register of Historic Places (NRHP). Sites can be considered eligible for the NRHP if they meet at least one of the following criteria:

- *Criterion A (Event):* Association with one or more events that have made a significant contribution to the broad patterns of national, state, or local history

- *Criterion B (Person):* Association with the lives of persons significant in the past

- *Criterion C (Design/Construction):* Embodiment of distinctive characteristics of a type, period, or method of construction; or representation of the work of a master; or possession of high artistic values; or representation of a significant and distinguishable entity whose components may lack individual distinction

- *Criterion D (Information Potential):* Properties that yield (or are likely to yield) information important in prehistory or history

TVA in consultation with the Tennessee SHPO determined the Area of Potential Effect (APE) for archaeological resources to be those lands upon which the new transmission line and infrastructure would be placed. This area would include a 3-acre tract to be used for laydown activities and, for the architectural inventory, those areas from which it would be visible in a 0.5-mile radius. Currently no historic properties listed in the NRHP are located within the project's APE (Wampler and Karpynec, 2004).

3.3.11.1. Archeological and Historic Sites

An archaeological survey conducted in July 2004 recorded two historic archaeological sites (40FY444 and 40FY445). Site 40FY444, located within a cultivated field in the northern portion of the project's APE, consists of a surface scatter of historic cultural material dating from the early to middle twentieth century. Site 40FY445, located along an exposed project access road in the central portion of the project's APE, consists of a scatter of historic cultural material dating from the late nineteenth to the early twentieth centuries. Archaeological deposits at both sites have been extensively disturbed; both the character and integrity of the archaeological sites have been compromised such that it is unlikely that they will yield information important to understanding history of the locality or region.

3.3.11.2. Historic Structures

A historical/architectural survey of the APE resulted in the identification of 11 previously unrecorded historic structures (HS-1 through HS-11) and no historic sites. All of these structures have suffered a loss of integrity caused by alterations and/or damage.

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CHAPTER 4

4. ENVIRONMENTAL CONSEQUENCES

4.1. Introduction

Chapter 4: Environmental Consequences and Chapter 3: Affected Environment form the detailed scientific and analytic basis for the summary comparisons presented in Chapter 2, Section 2.5 Project and Siting Alternatives.

Section 2.5 contains by option the predicted attainment and nonattainment of the two objectives listed in Chapter 1, Section 1.3 Objectives of the Fayette County, Tennessee, Power Supply Improvement Project. This chapter presents the detailed predicted effects of implementing Alternative 1: Do Not Build Additional Transmission Line (No Action) and Alternative 2: Construct Transmission Line (Action).

4.2. Effects of Alternative 1: Do Not Build Additional Transmission Line (No Action)

Factors outside of TVA's control are expected to continue to influence the landscape of the region. These include reasonable foreseeable private and public activities associated with industrial and residential development and associated infrastructure.

Should the proposed TVA transmission line not be built to the planned Gallaway Substation, SWTEMC would not be able to meet the projected increased load demands on its system and system outages in the project area would increase.

4.3. Effects of Alternative 2: Construct Transmission Line

4.3.1. Terrestrial Ecology

4.3.1.1. Terrestrial Plants

The project area is characterized as early successional grass forbs and mixed bottomland forest. No rare or uncommon plant communities were identified along the proposed transmission line route or laydown area during field surveys. The transmission line route would pass through vegetation types that are common and representative of the region. Approximately 28 acres of forested areas would be cleared for the new right-of-way. Adoption of the No Action Alternative would not result in any project-related impacts to the terrestrial ecology of the region. Any project-related impacts to the terrestrial plant ecology of the region as a result of the proposed Alternative 2 are expected to be insignificant.

4.3.1.2. Invasive Plant Species

Because of the previous level of disturbance to the native plant communities along the proposed transmission line route and laydown area, no impacts to such communities from the introduction or spread of invasive terrestrial plants are anticipated as a result of implementing either Alternative 1 or Alternative 2.

4.3.1.3. Terrestrial Animals

Although the majority of the proposed routes consist of relatively open habitats, some woodland habitats occur near streams and river crossings. Temporary fluctuations in populations of terrestrial animal species are anticipated during the construction of the proposed transmission line, laydown area, and access roads. Construction of the transmission line would remove some of these woodland habitats. Clearing would result in minimal habitat fragmentation and would slightly increase the percentage of forest edge in the vicinity. Although some species prefer edge habitat, other species could be negatively affected by these habitat changes. Small animals with relatively small home ranges or habitat area requirements that require specific structural habitat characteristics may be negatively affected by these conditions. However, these effects are expected to be minimal because of the high amount of habitat fragmentation that already exists along the proposed routes. Adoption of the No Action Alternative would not result in any project-related impacts to the terrestrial ecology of the region. The proposed Alternative 2 would not result in adverse direct or indirect impacts to terrestrial animals or their habitats.

4.3.2. Threatened and Endangered Species

4.3.2.1. Terrestrial Plants

No occurrences of listed plant species were identified along the proposed transmission line route or laydown area. Therefore, the implementation of either Alternative is expected to have no effect on threatened or endangered plants.

4.3.2.2. Terrestrial Animals

Suitable habitat for state-protected barking tree frog and Bachman's sparrow does not exist along the transmission line corridor. Therefore, neither species would be affected by the proposed project.

Habitat for Swainson's warbler, southeastern shrew, southern bog lemming, and meadow jumping mouse exists in the tracts of mixed bottomland forest and pasturelands that are in the vicinity of several stream crossings within the proposed transmission line route. These species likely occur in suitable habitat along the corridor. There would be temporary disturbance to these species during construction of the proposed transmission line. However, due to the abundance of suitable habitat in the surrounding area, the proposed project is not likely to result in adverse impacts to listed terrestrial animals.

No federally listed terrestrial species were identified on or near identified transmission line routes, and no effect on such species is anticipated.

4.3.2.3. Aquatic Animals

No federally listed aquatic species would be affected by the construction, operation, or maintenance of the proposed transmission line. Clearing of riparian vegetation and soil disturbance associated with construction of stream crossings and other construction or maintenance activities could result in runoff entering these waterways. Short-term impacts as a result of these activities could potentially occur to local populations of one state-listed fish species (northern madtom) if it resulted in an increased sediment load. Increased sedimentation could affect habitat availability, and canopy cover/riparian removal could lead

to increased water temperatures. These potential changes of the physical habitat in affected streams could in the long term disrupt or eliminate nearby populations of this species.

The implementation of stream protection measures as described in Section 4.3.9 Surface Water during construction and maintenance would help ensure no unacceptable impacts to state-listed aquatic animals. In addition, no impacts are expected to the viability of any aquatic species populations in the project area.

4.3.3. Wetlands

Approximately 1.2 acres of wetlands that meet some of the USACE (Environmental Laboratory, 1987) parameters for Federal jurisdictional wetlands under the Clean Water Act were identified in the proposed 161-kV transmission line right-of-way. These areas are regulated by TDEC; however, the USACE determined that these areas are not considered jurisdictional wetlands and that a Section 404 Nationwide permit would not be required.

Some clearing of woody vegetation would occur in the emergent/scrub-shrub wetlands; however, both Wetlands W1 and W2 would be spanned by the transmission line. Approximately 1 acre of forested Wetland W3 would be converted to, and maintained as, a scrub-shrub or emergent wetland. No structures would be located within the wetlands. Impacts are expected to be minor and insignificant with implementation of Best Management Practices (BMPs) (Muncy, 1999), TVA Environmental Quality Specifications, minimization of vehicle or equipment entry into the wetlands, nonmechanical clearing of the forested wetland, and compliance with state permits.

4.3.4. Aquatic Ecology

Watercourses in the project area considered to convey only surface water during storm events (i.e., wet-weather conveyances or ephemeral streams) would be protected by standard BMPs as identified in Muncy (1999). These BMPs are designed to minimize erosion and subsequent sedimentation in streams. Appendix VI lists the approximate locations of wet-weather conveyances.

The intermittent and perennial streams and their riparian habitats that occur within the project area would qualify for Standard Stream Protection (Category A) as designated by TVA Transmission Construction Guidelines Near Streams (Muncy, 1999). The Standard Stream Protection designation is based on the variety of species and habitats that exist in intermittent and perennial streams and the state and Federal requirements to avoid harming them. Criteria for the Standard Stream Protection designation included evidence of aquatic life and/or the presence of a well-defined channel with rock or soil substrate. SMZ width is determined by category and slope of land adjacent to the stream (Muncy, 1999). Streams identified for Standard Stream Protection along the proposed transmission line right-of-way and the SMZ boundaries as determined from the surveyed project centerline are noted in Appendix VI. Because of local topography, SMZs would extend 50 feet on either side of the proposed crossing (measured from the edge of the stream), but may extend further based on SMZ guidelines as outlined in Muncy (1999).

By following the appropriate stream protection requirements on streams identified in Appendix VI, the design, construction, and maintenance of the proposed project would not result in significant impacts to aquatic life. Support structures are normally located as far as possible from surface waters to minimize water-related impacts. All construction and

maintenance work, especially near streams, would be conducted following the requirements and recommendations presented in TVA's guidelines for environmental protection during transmission line construction (Muncy, 1999).

Road access to transmission line construction sites would be planned and constructed to minimize erosion and sedimentation effects. Use of existing access points would reduce access-related impacts. If no practicable alternative exists, trees along streams within the transmission line corridor and danger trees adjacent to the corridor would be cut; however, their stumps would not be removed and understory vegetation would be disturbed as little as possible. These initial clearing/felling activities (including danger trees) within the SMZ areas along streams would be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., feller-buncher), which would result in minimal soil disturbance and damage to low-lying vegetation. During transmission line maintenance activities, trees and other vegetation within the SMZ would be controlled with backpack-applied, spot-use herbicide to remove tree seedlings and other regrowth. Maintenance activities along streams would be by mechanical cutting or by selective use of USEPA registered herbicides. Permanent and temporary stream crossings would comply with appropriate Federal and state permitting requirements as well as any applicable designations and BMPs. Where herbicides are used, these chemicals would be applied following USEPA label restrictions and TVA BMPs.

4.3.5. Managed Areas

No Managed Areas and/or Ecologically Significant Sites occur within 5 miles of the proposed project site. Therefore, the implementation of either Alternative is expected to have no impact on Managed Areas. There are no listed National Rivers Inventory streams in the vicinity of the project; thus, no impacts would occur to such streams as a result of project activities.

4.3.6. Recreation

Direct, indirect, and cumulative impacts to public recreation resources, facilities, and activities as a result of implementation of Alternative 2 are anticipated to be temporary and insignificant.

4.3.7. Floodplains

The proposed 161-kV transmission line right-of-way would cross several floodplain areas in Fayette County, Tennessee. For compliance with EO 11988, an overhead transmission line and related support structures are considered a repetitive action in the 100-year floodplain. The construction of the support structures for the transmission line would not be expected to result in any increase in flood hazard, as a result of either increased flood elevations or changes in flow-carrying capacity of the streams being crossed. To minimize adverse impacts on natural and beneficial floodplain values, the rights-of-way would be revegetated where natural vegetation is removed, and the removal of unique vegetation, if any, would be avoided. BMPs would be used during construction activities. The TVA subclass review criteria for transmission line location in floodplains would be followed to ensure floodplain impacts would be minimized.

4.3.8. Groundwater

Because groundwater is a major source of drinking water in the proposed project area and the high susceptibility analysis findings, BMPs as described in Muncy (1999) would be used to avoid contamination of groundwater. Construction activities would seek to avoid springs as practicable. However, if springs are encountered and cannot be avoided during construction, BMPs would be used to control sediment infiltration. During revegetation and maintenance activities, fertilizers and herbicides would be avoided in areas that flow to springs or used sparingly to avoid contamination of groundwater. With the use of these BMPs, impact on groundwater from this action would be insignificant.

4.3.9. Surface Water

Soil disturbances associated with access roads or other construction activities can potentially result in adverse water quality impacts. Soil erosion and sedimentation can clog small streams, increase nutrient inflows, and threaten aquatic life. Removal of the tree canopy along stream crossings can increase water temperatures, algal growth, dissolved oxygen depletion, and adverse impacts to aquatic biota. Improper use of herbicides to control vegetation could result in runoff to streams and subsequent aquatic impacts.

However, TVA routinely includes precautions in the design, construction, and maintenance of its transmission line projects to minimize these potential impacts. Permanent stream crossings would be designed not to impede runoff patterns and the natural movement of aquatic fauna. Temporary stream crossings and other construction and maintenance activities would comply with appropriate state permit requirements and TVA requirements as described in Muncy (1999). Canopies in all SMZs would be left undisturbed unless there were no practicable alternative. Right-of-way maintenance would employ manual and low-impact methods wherever possible. In areas requiring chemical treatment, only USEPA-registered herbicides would be used in accordance with label directions designed in part to restrict applications in the vicinity of receiving waters and to prevent unacceptable aquatic impacts.

4.3.10. Visual

Visual consequences are examined in terms of visual changes between the existing landscape and proposed actions, sensitivity of viewing points available to the general public, their viewing distances, and visibility of proposed changes. Scenic integrity indicates the degree of intactness or wholeness of the landscape character. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. The foreground, middleground, and background viewing distances were previously described in Section 3.3.10 Visual.

Under the No Action Alternative, the transmission line corridor right-of-way would not be acquired, and the proposed transmission line would not be constructed by TVA. The existing scenic attractiveness would remain common to the area, and the scenic integrity would remain low to moderate.

Under Alternative 2, at the point of connection, which is immediately adjacent to TVA's South Jackson–South Memphis 161-kV transmission line, views would generally be precluded to motorists traveling SR 196 due to existing roadside vegetation. Residents who live nearby to the northwest would potentially have foreground views of transmission structures depending on seasonal variations in the existing vegetation. The few foreground views available would be in similar context to views of the existing 161-kV transmission line.

Duration of views would vary with available viewing positions, but would generally be short. Nearby residents and motorists traveling Hickory Withe Road or Harrell Road would potentially have views of crews and equipment that would access the transmission line route via the proposed access roads. Access Roadways One and Two would closely follow existing driveways, farm roads, or other light use roadbeds within this section, and their intermittent use would not result in prolonged adverse visual discord. Continued views of the route would be available from positions previously described in Section 3.3.10.

Continuing west and north, the transmission line and single-pole structures would be seen by very few nearby residents and even fewer motorists as the route would be directed away from Hickory Withe Road (SR 196) and would be screened from view by mature vegetation. Some residents farther to the east would potentially have foreground views of the structures through vegetation during the winter months.

Traveling northwest upon crossing the existing Johnsonville–Cordova 500-kV Transmission Line, the transmission line would generally not be visible to motorists traveling either Orr Road or Hickory Withe Road. Private landowners may notice single-pole structures that would cross agricultural land and areas intermixed with heavier vegetation. The transmission line segment that would potentially be visible across the expanse of farmland would be set against a backdrop of mature vegetation and would, therefore, remain subordinate to the larger landscape form. Views would generally be precluded as the route continued across Weber Branch into forestland again. Temporary and infrequent construction or maintenance traffic approaching this segment via Access Road Three would utilize an existing farm road and would produce no lasting visual discord.

Upon emerging from the woodland and resuming a northerly course, the proposed transmission line would be visible from within the foreground distance by at least four nearby residents along Orr Road, potentially one or two residents off Grimes Road, and, depending on changes in topography, motorists traveling along Orr Road. The residents to the west side of the proposed transmission line would view the single-pole structures and the corresponding 161-kV transmission line against a background of mature vegetation. In some instances, the proposed route would cross within the immediate foreground (0 feet to 300 feet from the observer) viewing distance of existing private residences. Through careful location of the single-pole 161-kV structures, which would weather over time to resemble more closely the existing smaller scale wooden-pole structures that currently provide service to the sparsely populated residential area, adverse impacts to the existing visual resources in this area would be greatly reduced. Views potentially available to motorists within this section would be brief and would be obscured by existing vegetation and homesites along the route. Residents who live along the latter portion of Grimes Road would have views of the transmission line and structures that would be mostly obscured by existing vegetation. These few residents would also have views of equipment and materials entering the right-of-way through Access Road Four. The temporary and infrequent use of this access roadway would not produce continual visual discord. As the proposed transmission line reaches the Hickory Withe Road crossing, the viewing distance for nearby residents decreases. However, an existing vegetative buffer, which ranges from 50 feet at its narrowest and 400 feet at its widest, would screen views from the majority of residents along the north/south roadway.

At the Hickory Withe Road crossing, the proposed transmission line would leave the intermittent vegetation and cross into agricultural fields where views would be brief and from between structures. Motorists and the nearby residents would have views of the

transmission structures within the foreground, which would be in context with existing lower-voltage transmission lines that service homes along Hickory Withe Road. Residents to the west of the roadway would likely not have views of equipment and materials accessing the route on Access Road Five. Residents to the east of the roadway would have broken views of the proposed route through an existing vegetative buffer and views would be similarly obscured of equipment and materials that would access the route via Access Road Six.

At the I-40 crossing, which receives traffic in excess of 36,000 vehicles per day (TDOT, 2004), motorists would have brief views of the transmission line between structures at the crossing point. In some brief instances, motorists would notice equipment and materials entering the transmission line route through Access Road Seven. The proposed transmission line, maintaining an oblique route away from the interstate roadway, would be even less discernable upon reentering the dense mature vegetation to the north. Views would generally not be available as the route bends to the west and follows the path of the river canal until reaching the large agricultural fields approaching Loosahatchie Road (SR 196). Motorists traveling this roadway would have intermittent views of the single-pole structures, set against a backdrop of the mature vegetation, which lines the bank of the canal. Within this transmission line segment, motorists along Loosahatchie Road may occasionally notice construction or maintenance traffic traveling on Access Road Eight, which would make use of an existing turf farm road.

As the proposed route turns to the north for the final segment approaching Gallaway, views would remain similar and in context with the existing lower-voltage transmission structures that parallel Loosahatchie Road. The new steel-pole structures would be incrementally taller and brighter in color than the existing poles, but would weather over time to resemble the wooden-pole structures more closely. Motorists would have temporary and infrequent foreground views of traffic that would access the transmission line via Access Road Nine. Intermittent views available to motorists would eventually give way as the route approached the town's light industrial area to the west of Loosahatchie Road where roadside vegetation thins and stops, allowing for immediate foreground views of the 161-kV transmission line and structures along a 0.33 to 0.50 mile portion of the roadway. Employees and visitors to Medegen Medical Products, local fire department/rescue volunteers, and several nearby residents would have immediate foreground views of the proposed transmission line and associated structures in context with the existing lower-voltage transmission line and wooden-pole structures that are currently in view.

The proposed 161-kV transmission line would span ground in rural Fayette County that is sparsely habited and is infrequently crossed by major travel ways. Motorists and nearby residents would notice temporary visual discord during the construction phases of the project, which could include heavy equipment operating throughout the proposed route, increases in construction personnel and traffic in the project vicinity, and the use of construction material and staging areas. This introduction of discordant elements would be minor and temporary in nature. The existing landscape character and visual resources would be altered by the construction, operation, and maintenance of the proposed right-of-way, 161-kV transmission line, and associated structures. The introduction of single-steel 161-kV suspension structures would result in an increase in the number of discordant elements in the landscape. However, the changes that would be discernable after the construction period would not collectively contribute to a pronounced alteration of the existing landscape character and subsequent degradation of the existing visual resources. Therefore, impacts to visual resource associated with this project would be insignificant.

4.3.11. Cultural Resources

TVA in consultation with the SHPO determined that the proposed project would not affect any historic properties (archaeological sites, historic sites, and historic structures) on or eligible for listing in the NRHP.

4.3.11.1. Archeological and Historic Sites

Two historic archaeological sites were identified during field surveys. Both the character and integrity of these sites have been compromised due to extensive disturbance of the area. These sites were determined not eligible for listing in the NRHP. Because no eligible or listed archaeological sites were identified within the APE, no consultations with affiliated federally recognized Native American tribes were conducted for sites of religious and cultural significance.

4.3.11.2. Historic Structures

Eleven historic structures were identified during field surveys. Pursuant to 36 CFR Part 800, TVA, in consultation with the Tennessee SHPO, determined that these historic properties were not eligible for listing in the NRHP due to the loss of integrity caused by alterations and/or damage to the structures.

4.4. Post Construction Impacts

4.4.1. Electric and Magnetic Fields

TVA recognizes there is public concern about whether any adverse health effects are caused by electric and magnetic fields (EMF) that result from generation, transmission, distribution, and use of electricity. Many scientific research efforts and other studies examining the potential health and other effects of EMF have been and are being done. TVA is aware of, and ensures that it stays aware of, published research and study results and directly supports some of the research and study efforts.

Studies, interpretations, and research to date are far from conclusive about potential associations between EMF and possible health impacts. A few studies have been interpreted as suggesting a weak statistical relationship between EMF and some rare forms of cancer. During the summer of 2001, the International Association for Research on Cancer reviewed available epidemiological studies and concluded that childhood leukemia appears to be associated with magnetic fields but that there was not a cause and effect relationship. It was concluded that the risk is small but may in some circumstances of higher exposure result in one type of childhood leukemia. The association also concluded that electric fields do not have a connection with cancer.

However, equal or greater numbers of similar studies show no association or cannot reproduce data interpreted as demonstrating an association. No laboratory research has found cause and effect health impacts from EMF and certainly none that are adverse. Neither has any concept of how these fields could cause health effects achieved scientific consensus.

There is also no agreement in the scientific or EMF research community as to what if any electric or magnetic field parameters might be associated with potential health effects.

There are no scientifically or medically defined safe or unsafe field strengths, although state regulatory bodies in Florida and New York have established edge of right-of-way magnetic field strength limits for 230-kV and larger power transmission lines.

TVA has analyzed and continues to analyze the fields associated with its typical line designs using the best available models and has measured actual fields for a large number of locations along its transmission line easements. Both model data and measurements show that the field strengths for TVA transmission lines are well within Florida and New York limits. Based on such models, expected field strengths for the proposed lines discussed in this document would also be within those existing state guidelines.

TVA's standard location practice has the effect of minimizing continuous public exposures to transmission line EMF. The transmission line route selection team uses a constraint model that place a 300-foot radius buffer around occupied buildings, except schools, for which a 1200-foot buffer is used. The purpose of these buffers is to reduce potential land use conflicts with yard trees, outbuildings, and ancillary facilities and potential visual impacts as well as exposures to EMF. Although not absolute location constraints, these buffers weigh heavily in location decisions, influencing selection of route options and alignments. Because EMF diminishes quickly with distance from the conductors, the routing of transmission lines using constraint buffers effectively reduces potential continuous public exposure to EMF. Crossing under lines or otherwise being near them for short periods may increase overall EMF exposure but only minutely.

4.4.2. Other Impacts

No significant impacts are expected to result from the relatively short-term activities of construction, such as noise, solid waste, etc. Appendixes II and III contain procedures for dealing with these issues.

4.5. Irreversible and Irretrievable Commitment of Resources

The materials used for construction of the proposed facilities would be committed for the life of the facilities. Some materials, such as ceramic insulators and concrete foundations, may be irrevocably committed, but the metals used in equipment, conductors, and supporting steel structures could be recycled. The useful life of steel-pole transmission structures is expected to be at least 60 years.

The rights-of-way used for the transmission lines would not be irreversibly committed and could be returned to other uses upon retirement of the line. In the interim, compatible uses of the right-of-way could continue.

Forest products and related wildlife that might have grown on the presently forested portions of the right-of-way would be lost for the life of the project. No locally or regionally significant lost forest or agricultural production would be expected.

4.6. Unavoidable Adverse Effects

As previously stated, clearing for this transmission line would result in the removal of approximately 28 acres of forest. After completion of the transmission line:

- Trees would not be permitted to grow within the right-of-way or to a determined height adjacent to the right-of-way that would endanger the transmission line.

- Clearing and construction would result in the disruption of some wildlife, but no permanent habitat changes would occur except in the wooded areas previously described.

- Any burning of cleared material would result in some short-term air pollution.

- Clearing, tree removal, and excavation for pole erection would result in a small amount of localized siltation.

- Transmission line visibility would be minimized through the location; however, there would be some degree of visual effect on the landscape in the project area.

4.7. Relationship Between Local Short-Term Uses of the Environment and Long-Term Productivity

The construction and operation of the proposed transmission line would supply electricity to meet the present and foreseeable expected loads in the northwest portion of Fayette County. This would be accomplished by a localized shift of a small amount of land to use for electric power transmission. If, during the useful life of the transmission line, it is no longer needed or technology renders it obsolete, it can be removed with relatively little difficulty. The land encumbered by the right-of-way could be returned to its previous use or used for other purposes.

The principal change in short-term use of the right-of-way would be the exclusion of trees and permanent structures. The amount of forest being lost is relatively small, approximately 28 acres within the right-of-way area, and areas removed from production are dispersed along the length of the transmission line. The right-of-way cannot support building construction for the life of the project, but the social and economic benefits of the project should outweigh this small loss.

4.8. Summary of TVA Commitments and Proposed Mitigation Measures

To support the preceding conclusions, TVA would commit to the following additional actions to avoid or mitigate possible environmental impacts:

<u>Protection of Aquatic Resources</u>

- All intermittent and perennial watercourse crossings would be designated as Level A, Standard Stream Protection, as outlined in Muncy (1999).

- Watercourses that convey only surface water during storm events (i.e., wet-weather conveyances or ephemeral streams) and that could be affected by the proposed transmission line route would be protected by standard BMPs as identified in Muncy (1999). These BMPs are designed to minimize erosion and subsequent sedimentation in streams.

General Best Management Practices for Clearing, Construction, and Maintenance

- TVA practices detailed in Appendixes II, III, IV, and V would be used during clearing, construction, and maintenance. EO 13112 directs all Federal agencies to prevent and control the introduction and spread of invasive species resulting from their activities. TVA would use reseeding mixes that are certified free of invasive, exotic plant seeds when replanting disturbed areas.

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CHAPTER 5

5. SUPPORTING INFORMATION

5.1. List of Preparers

John T. Baxter
Position: Biologist - Aquatic
Involvement: Threatened and Endangered Species - Aquatic Animals

W. Nannette Brodie
Position: Environmental Specialist, Professional Geologist
Involvement: Groundwater

J. Leo Collins
Position: Senior Botanist
Involvement: Terrestrial Ecology - Terrestrial Plants; Threatened and Endangered Species - Terrestrial Plants

T. Hill Henry
Position: Senior Zoologist
Involvement: Terrestrial Ecology - Terrestrial Animals; Threatened and Endangered Species - Animals

John M. Higgins
Position: Water Quality Specialist
Involvement: Surface Water

Marianne M. Jacobs
Position: Archaeologist Technician
Involvement: Cultural Resources

Todd C. Liskey
Position: Environmental Engineer - Siting and Environmental Design
Involvement: Purpose of and Need for Action; Alternatives Including Proposed Action

Anita E. Masters
Position: Senior NEPA Specialist
Involvement: NEPA Compliance and Document Preparation

Roger A. Milstead
Position: Floodplain Specialist
Involvement: Floodplains

David T. Nestor
Position: Contract Biologist
Involvement: Terrestrial Ecology - Terrestrial Plants; Threatened and Endangered Species - Terrestrial Plants

Richard L. Pflueger
Position: Land Use and Recreation Specialist
Involvement: Recreation

Kim Pilarski
Position: Senior Wetlands Biologist
Involvement: Wetlands

Jon C. Riley
Position: Landscape Architect
Involvement: Visual

Eric D. Romaniszyn
Position: Contract Aquatic Biologist
Involvement: Aquatic Ecology

Barbara Rosensteel
Position: Contract Wetlands Biologist
Involvement: Wetlands

Ed Scott
Position: Biologist - Aquatic
Involvement: Aquatic Ecology

Doug V. Thomas
Position: Electrical Engineer - Transmission System Planning
Involvement: The Decision; Alternatives

Jan K. Thomas
Position: Contract Natural Areas Specialist
Involvement: Managed Areas

E. Fowler Tucker
Position: Civil Engineer - Siting and Environmental Design
Involvement: Project and Siting Alternatives

W. Richard Yarnell
Position: Archaeologist
Involvement: Cultural Resources

5.2. List of Agencies and Persons Consulted

Federal Agencies

U.S. Army Corp of Engineers, Nashville, Tennessee

U.S. Fish and Wildlife Service, Cookeville, Tennessee

U.S. State Senators and Representatives from the study area

State Agencies

Tennessee Department of Agriculture, Nashville

Tennessee Department of Economic and Community Development, Nashville

Tennessee Department of Environment and Conservation, Nashville

Tennessee Department of Transportation, Nashville

Tennessee Historical Commission, Nashville

Tennessee Wildlife Resources Agency, Nashville

5.3. Literature Cited

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Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetland and deepwater habitats of the United States. Washington, D.C.: U.S. Fish and Wildlife publication FWS/OBS-79/31.

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APPENDIX I - CORRESPONDENCE

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Undated Correspondence From John McClurkan, Tenn. Dept. of Agriculture, to Todd Liskey, TVA

Todd C. Liskey
Tennessee Valley Authority
Transmission Line Projects
Siting and Environmental Design Department
1101 Market Street, MR 4G-C
Chattanooga, Tennessee 37402-2801

GALLAWAY 161-KV DELIVERY POINT

Dear Mr. Liskey:

This is in reference to Tennessee Valley Authority's project that was mailed to me on August 4, 2004.

The project as described by the project summary creates no incompatibility in our area of planning at this time.

John McClurkan
Signature

Administrator of Water Resources
Title

TN Dept. of Agriculture
Agency

P.O. Box 40627
Address

Nashville, TN 37204

August 4, 2004, Correspondence From Wilton Burnett, Jr., Tenn. Dept. of Economic and Community Development, to Todd Liskey, TVA

Todd C. Liskey
Tennessee Valley Authority
Transmission Line Projects
Siting and Environmental Design Department
1101 Market Street, MR 4G-C
Chattanooga, Tennessee 37402-2801

GALLAWAY 161-KV DELIVERY POINT

Dear Mr. Liskey:

This is in reference to Tennessee Valley Authority's project that was mailed to me on August 4, 2004.

The project as described by the project summary creates no incompatibility in our area of planning at this time.

Wilton Burnett, Jr.
Signature

DIR. OF SPECIAL PROJECTS
Title

TN DEPT. OF ECON. & COMM. DEV.
Agency

312 8TH AVE. N., 11 TH FLR
Address

NASHVILLE, TN 37243-0405

8/11/04

August 10, 2004, Correspondence From Michael Updike, TDOT, to Todd Liskey, TVA

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
PLANNING DIVISION
SUITE 900, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-0334

August 10, 2004

Mr. Todd C. Liskey
Tennessee Valley Authority
Transmission Line Projects
Siting and Environmental Design Department
1101 Market Street, MR 4G-C
Chattanooga, TN 37402-2801

SUBJECT: Gallaway 161-KV Delivery Point

Mr. Liskey:

This is in reference to Tennessee Valley Authority's project that was submitted to our office on August 4, 2004. The project as indicated seems to create no incompatibility issues in our area of planning at this time.

Enclosed are the latest functional plans for the Interchange Justification Study currently being developed at the I-40/SR-196 (Hickory Withe Road) location. Should these plans reveal any potential conflicts, or you require more information, please contact this office.

Sincerely,

Michael R. Updike
TDOT Planning Division
615-253-4007

Enclosure

cc: Ralph Comer, Bill Hart, Ron Baker, file

August 16, 2004, Correspondence From Tennessee State Historic Preservation Officer Herbert Harper to J. Bennett Graham, TVA

TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

August 16, 2004

Mr. J. Bennett Graham
Tennessee Valley Authority
Cultural Resources
Post Office Box 1589
Norris, Tennessee 37828-1589

RE: TVA, CULTURAL RESOURCES ASSESSMENT, 161-KV LINE AND LAYDOWN YARD, GALLAWAY, FAYETTE COUNTY, TN

Dear Mr. Graham:

At your request, our office has reviewed the above-referenced cultural resources survey report in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). Based on the information provided, we find that the project area contains no archaeological or architectural resources eligible for listing in the National Register of Historic Places.

Therefore, this office has no objection to the implementation of this project. If project plans are changed or archaeological remains are discovered during construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act.

Your cooperation is appreciated.

Sincerely,

Herbert L. Harper
Executive Director and
Deputy State Historic
Preservation Officer

HLH/jmb

August 11, 2004, Correspondence From Todd Liskey, TVA, to Larry Watson, USACE, page 1

August 11, 2004

Mr. Larry Watson
U. S. Army Corps of Engineers, Memphis District
Clifford Davis Federal Building
Room B-202
Memphis, TN 38103-1894

Dear Mr. Watson:

The Tennessee Valley Authority (TVA) is planning a new transmission line in Fayette County, Tennessee, to meet the growing power needs in the Gallaway area. The project will require constructing approximately 5.8 miles of transmission line from TVA's existing South Jackson-South Memphis 161-kV TL to Southwest Tennessee Electric Membership Corporation's (SWTEMC) new 161-kV substation to be located on the south side of the CSX Railroad and just east of State Route 196. TVA will acquire all new 100-foot-wide right-of-way. Construction of the transmission line would utilize both single pole and H-frame steel pole structures.

A total of four wetland areas totaling approximately 1.36 acres were identified in the proposed right-of-way during a ground survey conducted in July of 2004. A summary of information for three of the wetlands is provided on the enclosed wetland determination data forms (wetland 4 is approximately 0.10 acre), and locations of all four wetlands along the proposed right-of-way are shown on the attached map. Wetlands 1 and 2 (0.26 acre) are emergent, and wetlands 3 and 4 (1.10 acres) are forested. Each of the wetland areas meet the USACE parameters for wetlands which may be regulated under the Clean Water Act.

TVA will not place any structures in the wetlands. TVA's normal practices for clearing in wetlands include:

1. During line clearing, construction, and maintenance, identified wetlands, streams, and drainage-ways would not be modified so as to alter their natural hydrological patterns.

2. Hydric soils would not be disturbed or modified in any way that would alter their hydrological properties.

August 11, 2004, Correspondence From Todd Liskey, TVA, to Larry Watson, USACE, page 2

3. Initial right-of-way clearing within forested wetlands would be accomplished using accepted silvicultural practices for timber or vegetation harvesting within wetlands.

4. Within streamside or riparian zones (e.g., Streamside Management Zone), trees would be cut just above the ground line and stumps would not be uprooted or removed. Also, stumps would not be uprooted or removed in wetlands.

Clearing in wetlands is normally accomplished using either hand-held or other appropriate clearing equipment, such as a feller-buncher. The clearing method is selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the wetlands. TVA has found that in many cases using a low ground pressure feller-buncher to cut and remove trees results in less ground disturbance than cutting trees with chainsaws and dragging them out of the wetlands.

We are requesting your concurrence that no permit is required or that the above-mentioned work can be approved under Nationwide Permit 12 guidelines. We look forward to hearing from you as soon as possible. If you have any questions, please contact me by telephone at (423) 751-7631 or by email, tcliskey@tva.gov.

Sincerely,

Todd Liskey

Todd C. Liskey
Environmental Engineer
Siting and Environmental Design

August 27, 2004, Response From Larry Watson, USACE, to Todd Liskey, TVA, page 1

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
167 NORTH MAIN STREET B-202
MEMPHIS, TENNESSEE 38103-1894

REPLY TO
ATTENTION OF:

August 27, 2004

Construction – Operations Division
Regulatory Branch

Mr. Todd C. Liskey
Tennessee Valley Authority
1101 Market Street
Chattanooga, TN 37402-2801

Dear Mr. Liskey:

This is in response to your recent request for authorization from the U.S. Army Corps of Engineers to clear 4 wetland areas (a total of approximately 1.36 acres) for the construction of a transmission line near Galloway in Fayette County, Tennessee (shown on the enclosed map). The new line will run from the South Jackson-South Memphis 161-kV TL to the Southwest Tennessee Electric Membership Corporation's substation at the CSX railroad crossing of State Route 196.

Based on the information you provided as well as other information available to us, we have determined that a permit from the Corps of Engineers is not required for this project. This decision is based on our preliminary determination that this project will not result in the discharge of dredged or fill material into waters of the United States. As described, no transmission towers will be installed within wetlands and any clearing of vegetation will be done by hand or by other methods that do not involve mechanized landclearing. Because these activities will not result in a discharge of dredged or fill material into waters of the United States, no permit from our office is necessary.

This determination is valid for five years from the date of this letter unless new information warrants revision of the determination before the expiration date.

This determination does not obviate the need for other Federal, state, or local permits, approvals, or authorizations, including permit requirements of the Tennessee Water Quality Control Act of 1977. The Tennessee Department of Environment and Conservation may require an Aquatic Resource Alteration Permit (ARAP), and should be contacted at (615) 532-0625, or (901) 368-7962 for Fayette County, to ensure this project is in compliance with state law.

August 27, 2004, Response From Larry Watson, USACE, to Todd Liskey, TVA, page 2

If you have questions, please contact Roger Allan at (901) 544-3682 and refer to File No. MVM-2004-572-RSA.

Sincerely,

for Larry D. Watson
Chief
Regulatory Branch

Enclosure

August 25, 2004, Correspondence From Terry Templeton, TDEC, to Todd Liskey, TVA, page 1

ENVIRONMENTAL ASSISTANCE CENTER
TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
SUITE E-645, PERIMETER PARK
2510 MT. MORIAH ROAD
MEMPHIS, TENNESSEE 38115-1520
PHONE (901) 368-7939 STATEWIDE 1-888-891-8332 FAX (901) 368-7979

August 25, 2004

Mr. Todd C. Liskey
TVA
1101 Market Street, MR4G
Chattanooga, TN 37402-2801

RE: Request for Jurisdictional Determination
Transmission Line Project, Fayette County

Dear Mr. Liskey:

I have recently received your letter requesting review and comments for the 161,000-volt Fayette County transmission line project. Here is a summary of the potential issues we discussed during our phone conversation of 8/24/04.

The project will require an Aquatic Resource Alteration Permit (ARAP) to be obtained for the crossing of several streams and/or wetlands over the length of this project. ARAPs are handled through our Nashville Central Office of Water Pollution Control. You may reach the Nashville office at:

Department of Environment and Conservation
Division of Water Pollution Control
Natural Resources Section
6th Floor L & C Tower
401 Church Street
Nashville, TN 37234-1534

Additionally, if the amount of clearing required for this project exceeds one acre, a Notice of Intent (NOI) package will need to be submitted to this office. The NOI package must include a completed and signed NOI form, a site map, a storm water pollution prevention plan with certification language and signature as well as an appropriate fee based upon the total disturbed acreage for the project.

August 25, 2004, Correspondence From Terry Templeton, TDEC, to Todd Liskey, TVA, page 2

If you have any questions concerning this matter, please feel free to contact me at (901) 368-7959, or Lew Hoffman at (901) 368-7962.

Sincerely,

Terry R. Templeton, P.G.
Manager
Division of Water Pollution Control

cc: TDEC WPC NCO-Natural Resources Section
file

Cover Page for August 25, 2004, Correspondence From Robert Todd, TWRA, to Todd Liskey, TVA

Todd C. Liskey
Tennessee Valley Authority
Transmission Line Projects
Siting and Environmental Design Department
1101 Market Street, MR 4G-C
Chattanooga, Tennessee 37402-2801

GALLAWAY 161-KV DELIVERY POINT

Dear Mr. Liskey:

This is in reference to Tennessee Valley Authority's project that was mailed to me on August 4, 2004.

The project as described by the project summary creates no incompatibility in our area of planning at this time. SEE ATTACHED LETTER.

Robert M. Todd
Signature

FISH AND WILDLIFE ENVIRONMENTALIST
Title

TENNESSEE WILDLIFE RESOURCES AGENCY
Agency

ELLINGTON AGRICULTURAL CENTER
P.O. BOX 40747
Address

NASHVILLE, TN 37204

August 25, 2004, Correspondence From Robert Todd, TWRA, to Todd Liskey, TVA

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

August 25, 2004

Todd C. Liskey
Tennessee Valley Authority
Transmission Line Projects
Siting and Environmental Design Department
1101 Market Street, MR 4G-C
Chattanooga, TN 37402-2801

Re: Comments Concerning the Proposed 161-KV Transmission Line in Fayette County

Dear Mr. Liskey:

The Tennessee Wildlife Resource Agency requests that the proposed 161-kV transmission line in Fayette County be aligned and constructed to allow the vegetative buffer that currently exists at the project site to remain. This vegetative buffer provides bank stabilization for the Loosahatchie River Canal. You e-mail to me regarding this request indicated that TVA's siting engineer stated that the transmission line would be located 200 feet from the centerline of the canal; therefore our request should not impact your project.

Thank you for the opportunity to comment on this project.

Sincerely,

Robert M. Todd

Robert M. Todd
Fish and Wildlife Environmentalist

cc: Steve Seymour
Jerry Strom
USFWS, EPA, WPC

The State of Tennessee

AN EQUAL OPPORTUNITY EMPLOYER

September 10, 2004, Correspondence From Kirstin Condict, TDEC, to Todd Liskey, TVA

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Natural Heritage
14th Floor L&C Tower
401 Church Street
Nashville, Tennessee 37243-0447
Phone 615/532-0431 Fax 615/532-0231

September 10, 2004

Todd C. Liskey
Silting and Environmental Design Department
Tennessee Valley Authority
1101 Market Street
Chattanooga, Tennessee 37402

Subject: Project Review- 161,000-volt Transmission Line, Fayette County, Tennessee.

Dear Mr. Liskey:

Thank you for your letter and enclosures of August 4, 2004 regarding the above proposed project in Fayette County. We have reviewed the information submitted and offer the following comments for consideration.

Our records indicate that three state listed species have been documented within a 1.5-mile radius of the proposed line route. These species include:

Common Name	Scientific Name	Federal Status	State Status
Swainson's warbler	*Limnothlypis swainsonii*	-	D
Cedar elm	*Ulmus crassifolia*	-	S
Nodding rattlesnake-root	*Prenanthes crepidinea*	-	E

Federal status codes:
State status codes: E = Endangered; D = Deemed in Need of Management; S = Special Concern

The DNH requests that these rare species be considered during the planning of this project and every effort made to minimize impacts to these species should they be found in the immediate project area.

We thank you for considering Tennessee's rare species throughout the planning and implementation of this project. Should you have any questions, please do not hesitate to contact me at (615)532-0440.

Sincerely,

Kirstin Condict
Data Manager

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APPENDIX II – TENNESSEE VALLEY AUTHORITY RIGHT-OF-WAY CLEARING SPECIFICATIONS

1. General - The clearing contractor shall review the environmental evaluation documents (Categorical Exclusion Checklist, Environmental Assessment, or Environmental Impact Statement) for the project or proposed activity, along with all clearing and construction appendices, conditions in applicable general and/or site-specific permits, the storm water pollution prevention plan, and any Tennessee Valley Authority (TVA) commitments to property owners. The contractor shall then plan and carry out operations using techniques consistent with good engineering and management practices as outlined in TVA's Best Management Practice (BMP) manual (Muncy, 1992, and revisions thereto). The contractor will protect areas that are to be left unaffected by access or clearing work at and adjacent to all work sites. In sensitive areas and their buffers, the contractor will retain as much native ground cover and other vegetation as possible.

   If the contractor fails to use BMPs or to follow environmental expectations discussed in the prebid or prework meeting or present in contract specifications, TVA will order corrective changes and additional work as deemed necessary in TVA's judgment to meet the intent of environmental laws and regulations or other guidelines. Major violations or continued minor violations will result in work suspension until correction of the situation is achieved or other remedial action is taken at the contractor's expense. Penalty clauses may be invoked as appropriate.

2. Regulations - The clearing contractor shall comply with all applicable Federal, state, and local environmental and antipollution laws, regulations, and ordinances including without limitation all air, water, solid and hazardous waste, noise, and nuisance laws, regulations, and ordinances. The contractor shall secure or ensure that TVA has secured all necessary permits or authorizations to conduct work on the acres shown on the drawings and plan and profile for the contract. The contractor's designated project manager will actively seek to prevent, control, monitor, and safely abate all commonly recognized forms of workplace and environmental pollution. Permits or authorizations and any necessary certifications of trained or licensed employees shall be documented with copies submitted to TVA's right-of-way inspector or construction environmental engineer before work begins. The contractor will be responsible for meeting all conditions specified in permits. Permit conditions shall be reviewed in prework discussions.

3. Land and Landscape Preservation - The clearing contractor shall exercise care to preserve the condition of cleared soils by avoiding as much compacting and deep scarring as possible. As soon as possible after initial disturbance of the soil and in accordance with any permit(s) or other state or local environmental regulatory requirements, cover material shall be placed to prevent erosion and sedimentation of water bodies or conveyances to surface water or groundwater. In areas outside the clearing, use, and access areas, the natural vegetation shall be protected from damage. The contractor and his employees must not deviate from delineated access routes or use areas, and must enter the site at designated areas that will be marked. Clearing operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the remaining natural vegetation and adjacent surroundings in the vicinity of the work. In sensitive public or environmental areas, appropriate buffer zones shall be observed and the methods of clearing or reclearing modified to protect the buffer and sensitive area. Some areas may require planting native

plants or grasses to meet the criteria of regulatory agencies or commitments to special program interests.

4. Streamside Management Zones - The clearing contractor must leave as many rooted ground cover plants as possible in buffer zones along streams and other bodies of water or wet-weather conveyances thereto. In such streamside management zones (SMZ), tall-growing tree species (trees that would interfere with TVA's National Electric Safety Code clearances) shall be cut, and the stumps may be treated to prevent resprouting. Low-growing trees identified by TVA as marginal electrical clearance problems may be cut, and then stump treated with growth regulators to allow low, slow-growing canopy development and active root growth. Only approved herbicides shall be used, and herbicide application shall be conducted by certified applicators from the TVA's Transmission, Operations, and Maintenance organization after initial clearing and construction. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment, such as a feller-buncher. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Disturbed soils in SMZs must be stabilized by appropriate methods immediately after the right-of-way is cleared. Stabilization must occur within the time frame specified in applicable storm water permits or regulations. Stumps within SMZs may be cut close to the ground but must not be removed or uprooted. Trees, limbs, and debris shall be immediately removed from streams, ditches, and wet areas using methods that will minimize dragging or scarring the banks or stream bottom. No debris will be left in the water or watercourse. Equipment will cross streams, ditches, or wet areas only at locations designated by TVA after the application of appropriate erosion control BMPs consistent with permit conditions or regulatory requirements.

5. Wetlands - In forested wetlands, tall trees will be cut near the ground, leaving stumps and roots in place. The cambium may be treated with herbicides applied by certified applicators from the TOM organization to prevent regrowth. Understory trees that must be initially cut and removed may be allowed to grow back or may be treated with tree growth regulators selectively to slow growth and increase the reclearing cycle. The decision will be situationally made based on existing ground cover, wetland type, and tree species since tall tree removal may "release" understory species and allow them to grow quickly to "electrical clearance problem" heights. In many circumstances, herbicides labeled for water and wetland use may be used in reclearing.

6. Sensitive Area Preservation - If prehistoric or historic artifacts or features that might be of archaeological significance are discovered during clearing or reclearing operations, the activity shall immediately cease within a 100-foot radius, and a TVA right-of-way inspector or construction environmental engineer and the Cultural Resources Program manager shall be notified. The site shall be protected and left as found until a determination about the resources, their significance, and site treatment is made by TVA's Cultural Resources Program. Work may continue beyond the finding zone and the 100-foot radius beyond its perimeter.

7. Water Quality Control - The contractor's clearing and disposal activities shall be performed using BMPs that will prevent erosion and entrance of spillage, contaminants, debris, and other pollutants or objectionable materials into drainage ways, surface water, or groundwater. Special care shall be exercised in refueling equipment to prevent spills. Fueling areas shall be remote from any sinkhole, crevice, stream, or other water body.

Open burning debris will be kept away from streams and ditches and shall be incorporated into the soil.

The clearing contractor will erect and (when TVA or contract construction personnel are unable) maintain BMPs such as silt fences on steep slopes and adjacent to any stream, wetland, or other water body. BMPs will be inspected by the TVA field engineer or other designated TVA or contractor personnel routinely and during periods of high runoff, and any necessary repairs will be made as soon as practicable. BMP inspections will be conducted in accordance with permit requirements. Records of all inspections will be maintained on site, and copies of inspection forms will be forwarded to the TVA construction environmental engineer.

8. Turbidity and Blocking of Streams - If temporary clearing activities must interrupt natural drainage, appropriate drainage facilities and erosion/sediment controls shall be provided to avoid erosion and siltation of streams and other water bodies or water conveyances. Turbidity levels in receiving waters or at storm water discharge points shall be monitored, documented, and reported if required by the applicable permit. Erosion and sediment control measures such as silt fences, water bars, and sediment traps shall be installed as soon as practicable after initial access, site or right-of-way disturbance in accordance with applicable permit or regulatory requirements.

   Mechanized equipment shall not be operated in flowing water except when approved and, then, only to construct necessary stream crossings under direct guidance of TVA. Construction of stream fords or other crossings will only be permitted at approved locations and to current TVA construction access road standards. Material shall not be deposited in watercourses or within stream bank areas where it could be washed away by high stream flows. Any clearing debris that enters streams or other water bodies shall be removed as soon as possible. Appropriate U.S. Army Corps of Engineers and state permits shall be obtained for stream crossings.

9. Air Quality Control - The clearing or reclearing contractor shall take appropriate actions to limit the amount of air emissions created by clearing and disposal operations to well within the limits of clearing or burning permits and/or forestry or local fire department requirements. All operations must be conducted in a manner that prevents nuisance conditions or damage to adjacent land crops, dwellings, highways, or people.

10. Dust and Mud Control - Clearing activities shall be conducted in a manner that minimizes the creation of fugitive dust. This may require limitations as to type of equipment, allowable speeds, and routes utilized. Control measures such as water, gravel, etc., or similar measures may be used subject to TVA approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.

11. Burning - The contractor shall obtain applicable permits and approvals to conduct controlled burning. The contractor will comply with all provisions of the permit, notification, or authorization including burning site locations, controlled draft, burning hours, and such other conditions as stipulated. If weather conditions such as wind speed or wind direction change rapidly, the contractor's burning operation may be temporarily stopped by TVA's field engineer. The debris to be burned shall be kept as clean and dry as possible and stacked and burned in a manner that produces the minimum amount of smoke. Residue

from burning will be disposed of according to permit stipulations. No fuel starters or enhancements other than kerosene will be allowed.

12. Smoke and Odors - The contractor will properly store and handle combustible and volatile materials that could create objectionable smoke, odor, or fumes. The contractor shall not burn oil or refuse that includes trash, rags, tires, plastics, or other manufactured debris.

13. Vehicle Exhaust Emissions - The contractor shall maintain and operate equipment in a manner that limits vehicle exhaust emissions. Equipment and vehicles will be kept within the manufacturers' recommended limits and tolerances. Excessive exhaust gases will be eliminated, and inefficient operating procedures will be revised or halted until corrective repairs or adjustments are made.

14. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way. However, if emergency or "have to" situations arise, minimal/temporary maintenance to personal vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the right-of-way, except in designated sensitive areas. The clearing or reclearing contractor will properly maintain these vehicles with approved spill protection controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the area environmental coordinator or construction environmental engineer will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Equipment shall not be temporarily stored in stream floodplains, whether overnight or on weekends or holidays.

15. Noise Control - The contractor shall take steps to avoid the creation of excessive sound levels for employees, the public, or the site and adjacent property owners. Concentration of individual noisy pieces as well as the hours and locations of operation should be considered.

16. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers. The equipment and mufflers shall be maintained at peak operating efficiency.

17. Sanitation - A designated representative of TVA or the clearing contractor shall contact a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party. The facilities shall comply with applicable Federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.

18. Refuse Disposal - The clearing or reclearing contractor shall be responsible for daily cleanup and proper labeling, storage, and disposal of all refuse and debris on the site produced by his operations and employees. Facilities that meet applicable regulations and guidelines for refuse collection will be required. Only approved transport, storage, and disposal areas shall be used.

19. Brush and Timber Disposal (Reclearing) - The reclearing contractor shall place felled tree boles in neat stacks at the edge of the right-of-way, with crossing breaks at least every 100 feet. Property owner requests shall be reviewed with the project manager or right-of-way specialist before accepting them. Lop and drop activities must be specified in the contract

and on plan and profile drawings with verification with the right-of-way specialist before conducting such work. When tree trimming and chipping is necessary, disposal of the chips on the easement or other locations on the property must be with the consent of the property owner and the approval of the right-of-way specialist. No trees, branches, or chips shall remain in a surface water body or be placed at a location where washing into a surface water or groundwater source might occur.

20. Brush and Timber Disposal (Initial Clearing) - For initial clearing, trees are commonly part of the contractor's contract to remove as they wish. Trees may be removed from the site for lumber or pulpwood or they may be chipped or stacked and burned. All such activities must be coordinated with the TVA field engineer, and the open burning permits, notifications, and regulatory requirements must be met. Trees may be cut and left in place only in areas specified by TVA and approved by appropriate regulatory agencies. These areas may include sensitive wetlands or SMZs where tree removal would cause excessive ground disturbance or in very rugged terrain where windrowed trees are used as sediment barriers along the edge of the right-of-way.

21. Restoration of Site - All disturbed areas, with the exception of farmland under cultivation and any other areas as may be designated by TVA's specifications, shall be stabilized in the following manner unless the property owner and TVA's engineer specify a different method:

    A. The subsoil shall be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.

    B. If needed, appropriate soil amendments will be added.

    C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's "A Guide for Environmental Protection and Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities." Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.

    D. TVA holds the option, depending upon the time of year and weather condition, to delay or withdraw the requirement of seeding until more favorable planting conditions are certain. In the meantime, other stabilization techniques must be applied.

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APPENDIX III – TENNESSEE VALLEY AUTHORITY ENVIRONMENTAL QUALITY PROTECTION SPECIFICATIONS FOR TRANSMISSION LINE CONSTRUCTION

1. General – Tennessee Valley Authority (TVA) and/or the assigned contractor shall plan, coordinate, and conduct operations in a manner that protects the quality of the environment and complies with TVA's environmental expectations discussed in the preconstruction meeting. This specification contains provisions that shall be considered in all TVA and contract construction operations. If the contractor fails to operate within the intent of these requirements, TVA will direct changes to operating procedures. Continued violation will result in a work suspension until correction or remedial action is taken by the contractor. Penalties and contract termination will be used as appropriate. The costs of complying with the Environmental Quality Protection Specifications are incidental to the contract work, and no additional compensation will be allowed. At all structure and conductor pulling sites, protective measures to prevent erosion will be taken immediately upon the end of each step in a construction sequence, and those protective measures will be inspected and maintained throughout the construction and right-of-way rehabilitation period.

2. Regulations - TVA and/or the assigned contractor shall comply with all applicable Federal, state, and local environmental and antipollution laws, regulations, and ordinances related to environmental protection and prevention, control, and abatement of all forms of pollution.

3. Use Areas - TVA and/or the assigned contractor's use areas include but are not limited to site office, shop, maintenance, parking, storage, staging, assembly areas, utility services, and access roads to the use areas. The construction contractor shall submit plans and drawings for their location and development to the TVA engineer and project manager for approval. Secondary containment will be provided for fuel and petroleum product storage pursuant to 29CFR1910.106(D)(6)(iii)(OSHA).

4. Equipment - All major equipment and proposed methods of operation shall be subject to the approval of TVA. The use or operation of heavy equipment in areas outside the right-of-way, access routes, or structure, pole, or tower sites will not be permitted without permission of the TVA inspector or field engineer. Heavy equipment use on steep slopes (greater than 20 percent) and in wet areas will be held to the minimum necessary to construct the transmission line. Steps will be taken to limit ground disturbance caused by heavy equipment usage, and erosion and sediment controls will be instituted on disturbed areas in accordance with state requirements.

   No subsurface ground-disturbing equipment or stump-removal equipment will be used by construction forces except on access roads or at the actual structure, pole, or tower sites, where only footing locations and controlled runoff diversions shall be created that disturb the soil. All other areas of ground cover or in-place stumps and roots shall remain in place. (Note: Tracked vehicles disturb surface layer of the ground due to size and function.) Some disking of the right-of-way may occur for proper seedbed preparation.

   Unless ponding previously occurred (i.e., existing low-lying areas), water should not be allowed to pond on the structure sites except around foundation holes; the water must be directed away from the site in as dispersed a manner as possible. At tower or structure sites, some means of upslope interruption of potential overland flow and diversion around

the footings should be provided as the first step in construction-site preparation. If leveling is necessary, it must be implemented by means that provide for continuous gentle, controlled, overland flow or percolation. A good grass cover, straw, gravel, or other protection of the surface must be maintained. Steps taken to prevent increases in the moisture content of the in-situ soils will be beneficial both during construction and over the service life of any structure.

5. Sanitation - A designated TVA or contractor representative shall contact a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party. The facilities shall comply with applicable Federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.

6. Refuse Disposal - Designated TVA and/or contractor personnel shall be responsible for daily inspection, cleanup, and proper labeling, storage, and disposal of all refuse and debris produced by his operations and by his employees. Suitable refuse collecting facilities will be required. Only state-approved disposal areas shall be used. Disposal containers such as dumpsters or roll-off containers shall be obtained from a proper waste disposal contractor. Solid, special, construction/demolition, and hazardous wastes as well as scrap are part of the potential refuse generated and must be properly managed with emphasis on reuse, recycle, or possible give away, as appropriate, before they are handled as waste. Contractors must meet similar provisions on any project contracted by TVA.

7. Landscape Preservation - TVA and its contractors shall exercise care to preserve the natural landscape in the entire construction area as well as use areas, in or outside the right-of-way, and on or adjacent to access roads. Construction operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the natural vegetation and surroundings in the vicinity of the work.

8. Sensitive Areas Preservation - Certain areas on site and along the right-of-way may be designated by the specifications or the TVA engineer as environmentally sensitive. These areas include but are not limited to areas classified as erodible, geologically sensitive, scenic, historical and archaeological, fish and wildlife refuges, water supply watersheds, and public recreational areas such as parks and monuments. Contractors and TVA construction crews shall take all necessary actions to avoid adverse impacts to these sensitive areas and their adjacent buffer zones. These actions may include suspension of work or change of operations during periods of rain or heavy public use; hours may be restricted or concentrations of noisy equipment may have to be dispersed. If prehistoric or historic artifacts or features are encountered during clearing or construction operations, the operations shall immediately cease for at least 100 feet in each direction, and TVA's right-of-way inspector or construction superintendent and Cultural Resources Program shall be notified. The site shall be left as found until a significance determination is made. Work may continue elsewhere beyond the 100-foot perimeter.

9. Water Quality Control - TVA and contractor construction activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter, contaminants, debris, and other objectionable pollutants and wastes into flowing caves, sinkholes, streams, dry watercourses, lakes, ponds, and underground water sources.

The clearing contractor will erect and (when TVA or contract construction personnel are unable) maintain Best Management Practices (BMPs) such as silt fences on steep slopes and adjacent to any stream, wetland, or other water body. Additional BMPs may be required for areas of disturbance created by construction activities. BMPs will be inspected by the TVA field engineer or other designated TVA or contractor personnel routinely and during periods of high runoff, and any necessary repairs will be made as soon as practicable. BMP inspections will be conducted in accordance with permit requirements. Records of all inspections will be maintained on site, and copies of inspection forms will be forwarded to the TVA construction environmental engineer.

Acceptable measures for disposal of waste oil from vehicles and equipment shall be followed. No waste oil shall be disposed of within the right-of-way, on a construction site, or on access roads.

10. Turbidity and Blocking of Streams - Construction activities in or near SMZs or other bodies of water shall be controlled to prevent the water turbidity from exceeding state or local water quality standards for that stream. All conditions of a general storm water permit, aquatic resource alteration permit, or a site-specific permit shall be met including monitoring of turbidity in receiving streams and/or storm water discharges and implementation of appropriate erosion and sediment control measures.

    Appropriate drainage facilities for temporary construction activities interrupting natural site drainage shall be provided to avoid erosion. Watercourses shall not be blocked or diverted unless required by the specifications or the TVA engineer. Diversions shall be made in accordance with TVA's "A Guide for Environmental Protection and Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities."

    Mechanized equipment shall not be operated in flowing water except when approved and, then, only to construct crossings or to perform required construction under direct guidance of TVA. Construction of stream fords or other crossings will only be permitted at approved locations and to current TVA construction access road standards. Material shall not be deposited in watercourses or within stream bank areas where it could be washed away by high stream flows. Appropriate U.S. Army Corps of Engineers and state permits shall be obtained.

    Wastewater from construction or dewatering operations shall be controlled to prevent excessive erosion or turbidity in a stream, wetland, lake, or pond. Any work or placing of equipment within a flowing or dry watercourse requires the prior approval of TVA.

11. Clearing - No construction activities may clear additional site or right-of-way vegetation or disturb remaining retained vegetation, stumps, or regrowth at locations other than the structure sites and conductor setup areas. TVA and the construction contractor(s) must provide appropriate erosion or sediment controls for areas they have disturbed that have previously been restabilized after clearing operations. Control measures shall be implemented as soon as practicable after disturbance in accordance with applicable Federal, state, and/or local storm water regulations.

12. Restoration of Site - All construction disturbed areas, with the exception of farmland under cultivation and any other areas as may be designated by TVA's specifications, shall be stabilized in the following manner unless the property owner and TVA's engineer specify a different method:

A. The subsoil shall be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.

B. If needed, appropriate soil amendments will be added.

C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's "A Guide for Environmental Protection and Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities." Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.

D. TVA holds the option, depending upon the time of year and weather condition, to delay or withdraw the requirement of seeding until more favorable planting conditions are certain. In the meantime, other stabilization techniques must be applied.

13. Air Quality Control - Construction crews shall take appropriate actions to minimize the amount of air pollution created by their construction operations. All operations must be conducted in a manner that avoids creating a nuisance and prevents damage to lands, crops, dwellings, or persons.

14. Burning - Before conducting any open burning operations, the contractor shall obtain permits or provide notifications as required to state forestry offices and/or local fire departments. Burning operations must comply with the requirements of state and local air pollution control and fire authorities and will only be allowed in approved locations and during appropriate hours and weather conditions. If weather conditions such as wind direction or speed change rapidly, the contractor's burning operations may be temporarily stopped by the TVA field engineer. The debris for burning shall be piled and shall be kept as clean and as dry as possible, then burned in such a manner as to reduce smoke. No materials other than dry wood shall be open burned. The ash and debris shall be buried away from streams or other water sources and shall be in areas coordinated with the property owner.

15. Dust and Mud Control - Construction activities shall be conducted to minimize the creation of dust. This may require limitations as to types of equipment, allowable speeds, and routes utilized. Water, straw, wood chips, dust palliative, gravel, combinations of these, or similar control measures may be used subject to TVA's approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.

16. Vehicle Exhaust Emissions - TVA and/or the contractors shall maintain and operate equipment to limit vehicle exhaust emissions. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective repairs or adjustments are made.

17. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way. However, if emergency or "have to" situations arise, minimal/temporary

maintenance to personal vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the right-of-way except in designated sensitive areas. The Heavy Equipment Department within TVA or the construction contractor will properly maintain these vehicles with approved spill prevention controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the area environmental coordinator or construction environmental engineer will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Equipment shall not be temporarily stored in stream floodplains, whether overnight or on weekends or holidays.

18. Smoke and Odors - TVA and/or the contractors shall properly store and handle combustible material that could create objectionable smoke, odors, or fumes. The contractor shall not burn refuse such as trash, rags, tires, plastics, or other debris.

19. Noise Control - TVA and/or the contractor shall take measures to avoid the creation of noise levels that are considered nuisances, safety, or health hazards. Critical areas including but not limited to residential areas, parks, public use areas, and some ranching operations will require special considerations. TVA's criteria for determining corrective measures shall be determined by comparing the noise level of the construction operation to the background noise levels. In addition, especially noisy equipment such as helicopters, pile drivers, air hammers, chippers, chain saws, or areas for machine shops, staging, assembly, or blasting may require corrective actions when required by TVA.

20. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers as required by the Department of Labor's "Safety and Health Regulations for Construction." TVA may require spark arresters in addition to mufflers on some engines. Air compressors and other noisy equipment may require sound-reducing enclosures in some circumstances.

21. Damages - The movement of construction crews and equipment shall be conducted in a manner that causes as little intrusion and damage as possible to crops, orchards, woods, wetlands, and other property features and vegetation. The contractor will be responsible for erosion damage caused by his actions and especially for creating conditions that would threaten the stability of the right-of-way or site soil, the structures, or access to either. When property owners prefer the correction of ground cover condition or soil and subsoil problems themselves, the section of the contract dealing with damages will apply.

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APPENDIX IV – TENNESSEE VALLEY AUTHORITY TRANSMISSION CONSTRUCTION GUIDELINES NEAR STREAMS

Even the most carefully designed transmission line project eventually will affect one or more creeks, rivers, or other type of water body. These streams and other water areas are protected by state and Federal law, generally support some amount of fishing and recreation, and, occasionally, are homes for important and/or endangered species. These habitats occur in the stream and on strips of land along both sides (the streamside management zone [SMZ]) where disturbance of the water, land, or vegetation could have an adverse effect on the water or stream life. The following guidelines have been prepared to help Tennessee Valley Authority (TVA) Transmission Construction staff and their contractors avoid impacts to streams and stream life as they work in and near SMZs. These guidelines expand on information presented in "A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities."

Three Levels of Protection

During the preconstruction review of a proposed transmission line, TVA Resource Stewardship staff will have studied each possible stream impact site and will have identified it as falling into one of three categories: (A) standard stream protection, (B) protection of important permanent streams, or C) protection of unique habitats. These category designations are based on the variety of species and habitats that exist in the stream as well as state and Federal requirements to avoid harming certain species. The category designation for each site will be marked on the plan and profile sheets. Construction crews are required to protect streams and other identified water habitats using the following pertinent set(s) of guidelines:

(A) Standard Stream Protection

This is the standard (basic) level of protection for streams and the habitats around them. The purpose of the following guidelines is to minimize the amount and length of disturbance to the water bodies without causing adverse impacts on the construction work.

Guidelines:

1. All construction work around streams will be done using pertinent Best Management Practices (BMPs) such as those described in "A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities," especially Chapter 6, Standards and Specifications.

2. All equipment crossings of streams must comply with appropriate state permitting requirements. Crossings of all drainage channels, intermittent streams, and permanent streams must be done in ways that avoid erosion problems and long-term changes in water flow. Crossings of any permanent streams must allow for natural movement of fish and other aquatic life.

3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance

and impacts to the SMZ and surrounding area. Stumps can be cut close to ground level but must not be removed or uprooted.

4. Other vegetation near streams must be disturbed as little as possible during construction. Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations. Shorelines that have to be disturbed must be stabilized as soon as feasible.

(B) Protection of Important Permanent Streams

This category will be used when there is one or more specific reason(s) why a permanent (always-flowing) stream requires protection beyond that provided by standard BMPs. Reasons for requiring this additional protection include the presence of important sports fish (trout, for example) and habitats for Federal endangered species. The purpose of the following guidelines is to minimize the disturbance of the banks and water in the flowing stream(s) where this level of protection is required.

Guidelines:

1. Except as modified by guidelines 2-4 below, all construction work around streams will be done using pertinent BMPs such as those described in "A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities," especially Chapter 6, Standards and Specifications.

2. All equipment crossings of streams must comply with appropriate state (and, at times, Federal) permitting requirements. Crossings of drainage channels and intermittent streams must be done in ways that avoid erosion problems and long-term changes in water flow. Proposed crossings of permanent streams must be discussed in advance with Resource Stewardship staff and may require an on-site planning session before any work begins. The purpose of these discussions will be to minimize the number of crossings and their impact on the important resources in the streams.

3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Cutting of trees near permanent streams must be limited to those required to meet National Electric Safety Code and danger tree requirements. Stumps can be cut close to ground level but must not be removed or uprooted.

4. Other vegetation near streams must be disturbed as little as possible during construction. Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations. Shorelines that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible.

(C) Protection of Unique Habitats

This category will be used when, for one or more specific reasons, a temporary or permanent aquatic habitat requires special protection. This relatively uncommon level of protection will be appropriate and required when a unique habitat (for example, a particular spring run) or protected species (for example, one that breeds in a wet-weather ditch) is known to occur on or adjacent to the construction corridor. The purpose of the following guidelines is to avoid or minimize any disturbance of the unique aquatic habitat.

Guidelines:

1. Except as modified by Guidelines 2-4 below, all construction work around the unique habitat will be done using pertinent BMPs such as those described in "A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities," especially Chapter 6, Standards and Specifications.

2. All construction activity in and within 30 meters (100 feet) of the unique habitat must be approved in advance by Resource Stewardship staff, preferably as a result of an on-site planning session. The purpose of this review and approval will be to minimize impacts on the unique habitat. All crossings of streams also must comply with appropriate state (and, at times, Federal) permitting requirements.

3. Cutting of trees within 30 meters (100 feet) of the unique habitat must be discussed in advance with Resource Stewardship staff, preferably during the on-site planning session. Cutting of trees near the unique habitat must be kept to an absolute minimum. Stumps must not be removed, uprooted, or cut shorter than 0.30 meter (1 foot) above the ground line.

4. Other vegetation near the unique habitat must be disturbed as little as possible during construction. The soil must not be disturbed by plowing, disking, blading, or grading. Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible, in some cases with specific kinds of native plants. These and other vegetative requirements will be coordinated with Resource Stewardship staff.

Additional Help

If you have questions about the purpose or application of these guidelines, please contact your supervisor or the environmental coordinator in the local Transmission Service Center.

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Comparison of Guidelines Under the Three Stream and Waterbody Protection Categories (page 1)

Guidelines	A: Standard	B: Important Permanent Streams	C: Unique Water Habitats
1. Reference	• All TVA construction work around streams will be done using pertinent BMPs such as those described in "A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities," especially Chapter 6, BMP Standards and Specifications.	Except as modified by guidelines 2-4 below, all construction work around streams will be done using pertinent BMPs such as those described in "A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities," especially Chapter 6, BMP Standards and Specifications.	• Except as modified by guidelines 2-4 below, all construction work around the unique habitat will be done using pertinent BMPs such as those described in "A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities," especially Chapter 6, BMP Standards and Specifications.
2. Equipment Crossings	• All crossings of streams must comply with appropriate state and Federal permitting requirements. • Crossings of all drainage channels, intermittent streams, and permanent streams must be done in ways that avoid erosion problems and long-term changes in water flow. • Crossings of any permanent streams must allow for natural movement of fish and other aquatic life.	• All crossings of streams must comply with appropriate state and Federal permitting requirements. • Crossings of drainage channels and intermittent streams must be done in ways that avoid erosion problems and long-term changes in water flow. • Proposed crossings of permanent streams must be discussed in advance with Resource Stewardship staff and may require an on-site planning session before any work begins. The purpose of these discussions will be to minimize the number of crossings and their impact on the important resources in the streams.	• All crossings of streams also must comply with appropriate state and Federal permitting requirements. • All construction activity in and within 30 meters (100 feet) of the unique habitat must be approved in advance by Resource Stewardship staff, preferably as a result of an on-site planning session. The purpose of this review and approval will be to minimize impacts on the unique habitat.

Comparison of Guidelines Under the Three Stream and Waterbody Protection Categories (page 2)

Guidelines	A: Standard	B: Important Permanent Streams	C: Unique Water Habitats
3. Cutting Trees	• Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. • Stumps can be cut close to ground level but must not be removed or uprooted.	• Cutting of trees with SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance an impacts to the SMZ and surrounding area. • Cutting of trees near permanent streams must be limited to those meeting National Electric Safety Code and danger tree requirements. • Stumps can be cut close to ground level but must not be removed or uprooted.	• Cutting of trees within 30 meters (100 feet) of the unique habitat must be discussed in advance with Resource Stewardship staff, preferably during the on-site planning session. Cutting of trees near the unique habitat must be kept to an absolute minimum. • Stumps must not be removed, uprooted, or cut shorter than one foot above the ground line.
4. Other Vegetation	• Other vegetation near streams must be disturbed as little as possible during construction. • Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations. • Shorelines that have to be disturbed must be stabilized as soon as feasible.	• Other vegetation near streams must be disturbed as little as possible during construction. • Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will not be allowed in SMZs; however, a minimal amount of soil disturbance may occur as a result of clearing operations. • Shorelines that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible.	• Other vegetation near the unique habitat must be disturbed as little as possible during construction. • The soil must not be disturbed by plowing, disking, blading, or grading. • Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible, in some cases with specific kinds of native plants. These and other vegetative requirements will be coordinated with Resource Stewardship staff

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APPENDIX V – TENNESSEE VALLEY AUTHORITY RIGHT-OF-WAY VEGETATION MANAGEMENT

Tennessee Valley Authority (TVA) must manage its rights-of-way and easements to ensure emergency maintenance access and routine access to structures, switches, conductors, and communications equipment. In addition, TVA must ensure National Electrical Safety Code electrical clearances between tall-growing vegetation and any other structures. Trees located off right-of-way trees that could fall or be cut into a transmission line are also very important.

These requirements are imperative to the maintenance of the transmission system and, in some cases, underbuilt distribution lines. It is seldom understood by customers or the general public that electricity must continuously be produced and transmitted on an instant-to-instant basis to serve the demand placed on the system by continuously changing electrical load. When a switch is turned on, electricity must flow instantaneously. With increasingly complex and diverse electronic equipment controlled by computers, microchips, and other systems that respond to microsecond interruptions, any disturbance on transmission or distribution lines instantaneously affects the overall reliability of critical devices, especially production devices; security systems; process controls; medical devices; water purification and sewage treatment systems; fire and safety protection systems; communication and control systems; etc. These systems have little tolerance of even a few microseconds of interruption.

Each year, TVA must assess the conditions of the vegetation on and along its rights-of-way. This is accomplished by aerial inspections of each line, periodic walking inspections, information from aerial photographs, information from TVA field personnel, property owners, and the general public. Information is developed regarding vegetation species present, the mix of species, the observed growth, the seasonal growing conditions, and the density of the tall vegetation. TVA also evaluates the proximity, height, and growth rate of trees that may be adjacent to the right-of-way and that may be a danger to the line or structures. TVA right-of-way program administrators develop a vegetation-reclearing plan that is specific to each line segment; it is based on terrain conditions, species mix, growth, and density. They evaluate accessibility, right-of-way, and adjacent sensitive areas, land use and development, and a series of additional parameters. To the maximum extent possible, line segments from substation busbar to substation busbar should be recleared in the same year so a line can be made as reliable as reasonably possible.

Complicating factors are the rich diversity of tall-growing and climbing vegetation species in the power service area. The long growing season with abundant rain greatly accelerates growth in the moderate to rich soils of the TVA power service area. In addition, many rapid growing species are accelerated growers when competing vegetation is removed or reduced. Diverse geographic features, slopes, and conditions along line easements create many sensitive environmental and public interest areas on or adjacent to rights-of-way.

For the above reasons, TVA uses an integrated vegetation management approach. In farming areas of right-of-way crops and pasture, TVA encourages property owner management of the right-of-way using low-growing crops year after year. In dissected terrain with rolling hills and interspersed woodlands traversed by the rights-of-way, TVA uses mechanical mowing to a large extent.

When slopes become hazardous to farm tractors and rotary mowers, TVA may use a variety of herbicides specific to the species present with a variety of possible application techniques. When scattered small segments of tall-growing vegetation are present but accessibility along the right-of-way is difficult or the path to such segments is very long compared to the amount present, herbicides may be used.

In very steep terrain, in sensitive environmental areas, in extensive wetlands, at stream banks, and in sensitive property owner land use areas, hand clearing may be utilized. Hand clearing is recognized as one of the most hazardous occupations documented by the Occupational Health and Safety Administration. For that reason, TVA is actively looking at better control methods including use of low-volume herbicide applications, occasional singletree injections, and tree-growth regulators.

TVA does not encourage individual property owner tree reclearing activity because of the high hazard potential of hand clearing, possible interruptions of the line, and electrical safety considerations for untrained personnel that might do the work. Private property owners may reclear the right-of-way with trained reclearing professionals.

TVA's experience initially was completely with hand clearing. World War II manpower shortages forced TVA to look toward developments in herbicide research. An era of near exclusive use of herbicides existed. Then, because of the discovery of residue accumulations with many pesticides and price increases of herbicides, high-volume applications lost favor, and TVA sought other modes of vegetation control. Farm equipment of greater power and efficiency allowed use of tractor-mounted rotary mowers. These mowers not only cut the tall saplings and seedlings on the right-of-way, they shatter the stump and the supporting near-surface root crown. The tendency of resistant species is to resprout from the root crown, and shattered stumps produce a multistem dense stand in the immediate area. Repeated use of the mowers on short-cycle reclearing with many original stumps regrowing in the above manner creates a single-species thicket or monoculture. With the original large root system and multiple stems, the resistant species can and usually do produce regrowth at the rate of 5-10 feet in a year. In years with high rainfall, the growth can reach 12-15 feet in a single year.

These created, dense, monoculture stands can become nearly impenetrable for even large tractors. Such stands have low diversity, little wildlife food or nesting potential, and become a property owner concern. They tend to spread off the right-of-way into more desirable species areas. Increasingly, TVA is receiving complaints about the shatter sapling debris density. The potential exists for insect invasion or fungus infection resulting from the easy invasion of damaged specimens or debris. Once started, such infestations or invasions can spread into valuable timber of the same or related species off the right-of-way.

Therefore, TVA has been working with universities (such as Mississippi State University, University of Tennessee, Purdue University, and others), chemical companies, other utilities, and personnel of the U.S. Department of Transportation, U.S. Fish and Wildlife Service, and U.S. Forest Service to explore other means of dealing with problem vegetation. The results have been strong recommendations to use species-specific, low-volume herbicide applications in more situations. Research, demonstrations, and other right-of-way programs show a definite improvement of rights-of-way treated with selective low-volume applications of new herbicides using a variety of application techniques and timing.

The above-named universities strongly recommend low-volume herbicide applications since their research demonstrates much wider plant diversity after such applications. They report better ground erosion protection and the development of more wildlife food plants and cover plants. In most situations, there is increased development of wild flowering plants and shrubs. In conjunction with herbicides, the diversity and density of low-growing plants provide control of tall-growing species through competition.

Wildlife managers are specifically requesting the use of herbicides in place of rotary mowing in order to avoid damage to nesting and tunneling wildlife. This method retains groundcover year-round with a better mix of food species and associated high-protein insect populations for birds in the right seasons. Most also report less damage to soils (even when compared with rubber-tired equipment).

Property owners interested in tree production are requesting use of low-volume applications rather than hand or mechanical clearing because of the insect and fungus problems in damaged vegetation and debris left on rights-of-way. The insect and fungus invasions such as pine tip moth, oak leaf blight, sycamore and dogwood blight, etc., are becoming widespread across the nation.

Some property owners have special interests. In those cases, TVA attempts to work with them to either have them sign agreements in which they maintain the right-of-way in right-of-way crops or pasture or they do the actual right-of-way maintenance. Some may choose to use low-growing trees or fruit trees, sod, vegetable crops, or other low vegetation types.

TVA discusses with property owners the potential to sign an agreement to manage their land for wildlife under the auspices of "Project Habitat," a joint TVA/American Cyanamid wildlife organization. The property owner maintains the right-of-way in wildlife food and cover with emphasis on quail, turkey, deer, or related forms. A variation used in or adjacent to developing suburban areas is to sign agreements with the developer and residents to plant and maintain wildflowers on the right-of-way.

TVA places strong emphasis on developing rights-of-way in the above manner. When the property owners do not agree to these opportunities, TVA must maintain the right-of-way in the most environmentally acceptable, cost and vegetation effective and efficient manner possible.

Approved Herbicides for Usage on TVA Rights-of-Way

Trade Name	Active Ingredients	Label Signal Word
Accord	Glyphosate/Liquid	Caution
Arsenal	Imazapyr/Liquid/Granule	Caution
Escort	Metsulfuron Methyl/dry flowable	Caution
Garlon	Triclopyr/Liquid	Caution
Garlon 3A	Triclopyr/Liquid	Danger
Diuron	Diuron/Flowable powder	Caution
Spike 40P	Tebuthiuron/Pellet	Caution
Spike 80W	Tebuthiuron/Wettable powder	Caution
Transline	Clopyralid/Liquid	Caution
Pathfinder II	Triclopyr/RTU	Caution
Krenite UT	Fosamine Ammonium	Warning
Vanquish	Diglycolamine	Caution

Approved Herbicides for Bare Ground Areas

Trade Name	Active Ingredients	Label Signal Word
Chopper	Imazapyr/RTU	Caution
Topsite	Diuron/Imazapyr	Caution
Roundup	Glyphosate/Liquid	Caution
SpraKil SK-26	Tebuthiuron and Diuron	Caution
Sahara	Diuron/Imazapyr	Caution
Roundup Pro	Glyphosate	Caution
Endurance	Prodiamine	Caution
Predict	Norflurazon	Caution

Tree growth regulators (TGRs) are being considered for use on tall trees that have special circumstances where they must be trimmed on a regular cycle.

Approved TGRs for Use on TVA Property

Trade Name	Active Ingredients	Label Signal Word
TGR	Flurprimidol	Caution
Profile 2SC	TGR-paclobutrazol	Caution

The herbicide Pathway is being considered for use following initial clearing. Test plots have been established to determine the effectiveness of Pathway. Pathway is a mix of Picloram and 2,4-D and carries a "Warning" signal word.

These herbicides have been evaluated in extensive studies at universities in support of registration applications and label requirements. Most have been reviewed in the U.S. Forest Service (USFS) Vegetation Management Environmental Impact Statements (EISs), and those evaluations are incorporated here by reference. The result of these reviews has been a consistent finding of limited environmental impact beyond that of control of the target vegetation. All the listed herbicides have been found to be of low-environmental toxicity to resources (including buffer zones for listed threatened or endangered species) when applied by trained applicators following the label and registration procedures.

Those not addressed in the USFS EISs or their supporting research have been peer reviewed in university research, addressed in U.S. Environmental Protection Agency (USEPA) literature reviews, or are discussed in documents on file at USEPA and U.S. Fish and Wildlife Service libraries. On the basis of this literature and TVA's reviews, the approved list above has been compiled and is reviewed again each year as new information is published.

The rates of application utilized are those listed on the USEPA-approved label and consistent with the revised application rates of the USFS Vegetation Management EIS Record of Decision. These typical application rates, in pounds/acre of active ingredient, are as follows:

Herbicide	Application Method					
	Aerial Liquid	Aerial Granule	Mechanical Liquid	Mechanical Granule	Manual Hand	Manual Foliar
2,4-D amine	2.0		2.5			2.0
2.4-D ester	2.5		4.0			2.0
2.4-DP	3.0		4.0			1.0
Dicamba			2.0			2.0
Krenite	6.0		7.8			
Glyphosate	1.5		1.5			1.0
Hexazinone	4.0	4.0	4.0	4.0	4.0	4.0
Imazapyr	0.75		0.75			0.75
Fuel oil	0.5		2.0			1.5
Limonene	0.9		0.9			0.9
Picloram	0.5		0.7			0.4
Sulfomet	0.13		0.17			0.06
Tebuthiuron	1.0	1.0	1.0	1.0		4.0
Triclopyr amine	4.0		4.0			4.0
Triclopyr ester	4.0		4.0			4.0

TVA currently uses primarily low-volume applications of foliar and basal applications of Accord (Glyphosate) and Accord (Glyphosate)-Arsenal (Imazapyr) tank mixes. Glyphosate is one of the most widely used herbicidal active ingredients in the world and has been continuously the subject of numerous exhaustive studies and scrutiny to determine its potential impacts on humans, animals, and the environment.

Accord, labeled for vegetation management in forestry and utility rights-of-way applications, has a full aquatics label and can be applied to emergent weeds in all bodies of fresh and brackish water. There is no restriction on the use of treated water for irrigation, recreation, or domestic purposes.

Accord is applied to the foliage of actively growing plants. The active ingredient is absorbed through the leaves and rapidly moves throughout the plant. Glyphosate prevents the plant from producing amino acids that are unique to plants and are building blocks of plant proteins. The plant, unable to make proteins, stops growing and dies.

The favorable environmental fate characteristic of Accord herbicide and its major metabolite (breakdown product) aminomethylphosphonic acid (AMPA) is well known. Continuing research is underway with more than 400 studies conducted to date in the laboratory and under field use conditions. These studies show rapid breakdown, little soil or plant debris retention, and little vertical movement into soil below the surface.

Glyphosate is naturally degraded by microbes in soil and water under both aerobic (with oxygen) and anaerobic (without oxygen) conditions. AMPA is further degraded in soil and sediments to phosphorus, nitrogen, hydrogen, and carbon dioxide. Glyphosate binds

rapidly and completely to a wide range of soils and sediment when introduced into the environment. This essentially eliminates movement in the soil. The average half-life of glyphosate in soils is less than 45 days. Half-life for the dissipation of glyphosate in environmental waters ranges from 1.5 to 14 days.

Glyphosate is nontoxic to birds, mammals, and bees and has been shown not to bioaccumulate since it acts in plants through an enzyme system that does not exist in animals or humans.

Arsenal (Imazapyr) has been similarly tested, and it is found to have low-leaching potential in soils. When available on or in the soil, it is broken down rapidly by soil microbes to naturally occurring compounds. When not available, Imazapyr is bound tightly to soil colloids and is unavailable for movement. The half-life in soil is 25 to 65 days.

Extensive chronic and acute toxicity studies have made Arsenal a USEPA-classified herbicide as practically nontoxic to humans, mammals, birds, fish, aquatic invertebrates, and insects. The chronic studies demonstrate that Imazapyr is non-teratrogenic, non-mutagenic, and not a carcinogen.

The mode of action suppresses amino acids of the plant via an enzyme system containing acetohydroxy acid synthase. This enzyme system does not exist in other forms of life including humans and animals.

Revision July 2003

APPENDIX VI - APPROXIMATE LOCATIONS AND LEVELS OF PROTECTION FOR WATERCOURSES WITHIN THE RIGHT-OF-WAY OF THE PROPOSED TRANSMISSION LINE

Crossing Number	Approx. Watercourse Location/Station Nos.	Watercourse Type*	Commitments	SMZ Widths (feet)
1	6+350	WWC	Standard BMPs	N/A**
2	5+575	WWC	Standard BMPs	N/A
3	5+200	WWC	Standard BMPs	N/A
4	4+300	WWC	Standard BMPs	N/A
5	4+200	WWC	Standard BMPs	N/A
6	3+250	WWC	Standard BMPs	N/A
7	3+100	WWC	Standard BMPs	N/A
8	2+225	Pond	Category A SMZ	50
9	2+225	WWC	Standard BMPs	N/A
10	Access road	WWC	Standard BMPs	N/A
11	Access road	WWC	Standard BMPs	N/A
12	16+560	Weber Branch	Category A SMZ	50
13	15+500	WWC	Standard BMPs	N/A
14	12+350	WWC	Standard BMPs	N/A
15	12+100	WWC	Standard BMPs	N/A
16	11+650	WWC	Standard BMPs	N/A
17	11+400	WWC	Standard BMPs	N/A
18	11+250	WWC	Standard BMPs	N/A
19	11+100	WWC	Standard BMPs	N/A
20	10+25	WWC	Standard BMPs	N/A
21	26+150	WWC	Standard BMPs	N/A
22	24+300	WWC	Standard BMPs	N/A
23	22+400	WWC	Standard BMPs	N/A
24	19+550	WWC	Standard BMPs	N/A
25	19+250	WWC	Standard BMPs	N/A
26	19+80	WWC	Standard BMPs	N/A
27	19+75	Intermittent	Category A SMZ	50
28	18+525	WWC	Standard BMPs	N/A

Crossing Number	Approx. Watercourse Location/Station Nos.	Watercourse Type*	Commitments	SMZ Widths (feet)
29	28+400	WWC	Standard BMPs	N/A
30	30+75	WWC	Standard BMPs	N/A
31	36+250	Loosahatchie River	Category A SMZ	50
32	Access road	Perennial	Category A SMZ	50
33	Access road	WWC	Standard BMPs	N/A
34	42+325	Perennial	Category A SMZ	50
35	42+100	Perennial	Category A SMZ	50
36	43+325	Little Cypress Creek Canal	Category A SMZ	50
37	43+425	WWC	Standard BMPs	N/A
38	43+425	WWC	Standard BMPs	N/A
39	46+200	WWC	Standard BMPs	N/A
40	47+450	WWC	Standard BMPs	N/A

*WWC=wet-weather conveyance. Perennial or intermittent stream type determined by level of flow and evidence of aquatic life at time of site visit in July 2004.

** N/A = not applicable.